INNOVATION IN QUANTITY SURVEYING PRACTICE FIRMS: AN INVESTIGATION OF INNOVATION RESPONSE DURING COMPRESSED PRE-CONTRACT TIMELINES IN NIGERIA.

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I have come to understand that, since life is synonymous with challenges, the only way to keep beating life to its music is to keep learning new things. Research, to me, is a proactive framework for learning. When one stops learning, I believe, one stops living! As a chartered quantity surveyor and a professional of close to three decades, I was on a particular project where my ability in knowledge creation using a systematic methodology was challenged, and successfully too. I took it in good faith and quickly chose a way to fill the gap. That was how I came to acquiring a doctorate that is focused on professional practice, the Doctor of Built Environment. Without prejudice to the loads of research deeply engraved in abstract or theoretical foundations, my research paradigm has always been that research should be founded and directed towards resolving real-life problems. So, my first appreciation goes to the unknown critic who made me start the doctoral journey.

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DECLARATION OF PUBLICATIONS BASED ON THIS THESIS

For some measures of academic feedback and validity, the progress of the study was presented at International Post Graduate Research Conferences (IPGRC) at regular intervals. Subsequently, the following publications were made which, in addition to the feedbacks received, were very useful in the process of the research:

1. Balogun, O. (2013). Implementing Innovation in Small Quantity Surveying Firms in Nigeria (Poster Presentation). In: V. Ahmed (Ed.), *Proceedings of the 11th International Post Graduate Research Conference*, 8-10 April 2013, Salford, UK, p. 1147.

2. Balogun, O. and Barrett, P. (2015). Innovation as a Response Strategy to Compressed Time Demands for Pre-Contract Documentation in Quantity Surveying Firms in Nigeria. In: V. Ahmed (Ed.), *Proceedings of the 12th International Post Graduate Research Conference*, 10-12 June 2015, Salford, UK, pp. 283-299.

3. Balogun, O. and Higham, A. (2017). A Theoretical Model for Built Environment Practitioner Research at Doctoral Level. In: C. Pathirage (Ed.), *Proceedings of the 13th International Post Graduate Research Conference*, 14-15 September 2017, Salford, UK, pp. 343-354.

ABSTRACT

Reflecting on the pre-contract activities of a quantity surveying (QS) firm, a recent project commission came to focus in which there was an acute shortage of time to produce pre-contract documents due to the compressed pre-contract timeline given by the client. Preliminary investigations reveal that compressed pre-contract timeline is a chronic phenomenon in the Nigerian construction industry. However, literature is short on models on how QS firms do respond to this problem. In the main, this research seeks to understand how professional QS firms respond to the pressures of compressed pre-contract timelines and to determine to what extent those responses are innovative. Since the research is based in practice but presented through the academy, it also seeks to justify practice-based research in the built environment, both in rigour and substance, through a theoretical model that attempts to bridge the chasm in perception between academic purists and practitioners on practice-based research.

With a research philosophical orientation of idealism, interpretivism and value-laden, a multiple-case methodology of six QS firms incorporating interviews, direct observation and documentation as instruments of data collection were employed. Data were analysed thematically using template analysis, an *a priori* technique common to healthcare research but hitherto unfamiliar in built environment. In the main, the study concludes that QS firms respond to compressed time demand mostly through innovative means with identified features. These features enable the development and validation of an innovation process model that could prove very useful in analysing data and understanding innovation processes in QS firms. Also, through relevant concepts, theories and models, the study appears to sit comfortably within a theoretical model developed for practice-based research.

KEYWORDS: Innovation, compressed pre-contract time, practice-based research, quantity surveying practice firms, model.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Introduction

This chapter gives an overview of the important background issues to the study. It attempts to ground the study in practice-based research and to show that the problem being investigated is rooted in practice using a trigger from a recent project commission. A consideration is given to the rigour-relevance debate as it relates to problem-oriented or practice-based research engagement. A preliminary discussion of the probable solution to the research problem is attempted as background for more robust discussions in subsequent chapters. It further discusses the provision of the existing procurement regulation in Nigeria within the context of the problem being investigated and discusses the budgetary process of the Federal Government and how the process might have effects on the problem. It provides the justification for the research, identifies the aim and highlights the objectives of the study. Finally, the chapter defines the scope and shows the structure of the study.

1.2 Background and Research Context

1.2.1 Need for Practice-Based Research

In her seminal work in practice-based research in the arts, Gray (1996, p. 3) argues that practice-led research occurs where:

> Questions, problems, challenges are identified and formed by the needs of the practice and practitioners and secondly that the research strategy is carried out through practice, using predominantly methodologies and specific methods familiar to us as practitioners.

Recent works in epistemology (Eraut, 1994; Gibbons *et al*., 1994; Jarvis, 1999; Drake and Heath, 2011 and Egbu, 2012a) demonstrate the importance of knowledge production in practice and how professionals can initiate research that is grounded in practice. The experiential model (Kolb, 1984) shows how to reflect and engage with problems in practice towards generating knowledge.

Jarvis (1999) discusses the need for practitioners to be engaged in key research initiatives particularly the ones that have greater relevance to practice. For instance, Jarvis (1999 p. xii) opines that, "the world of work rather than the ivory tower of the university is the new location for a great deal of contemporary research". Even though this assertion is arguable, as it will take a lot more than rhetoric to win the heart of hard-core academic researchers who are neck-deep in conventional research process, it however gives the necessary encouragement towards facilitating practice-based research grounded in some practice-context problems.

The new industrial strategy launched in 2017 in the UK (HM Government, 2017, p. 9), is meant, "to improve living standards and economic growth by increasing productivity and driving growth across the whole country". One of its ten pillars is, "investing in science, research and innovation" for industrial and commercial applications. This places emphasis on the commercialisation of research and a focus on practice-led or industry-motivated research rather than concentrating on basic research. This also seems to confirm that there would be more government funding for higher education research in the areas that are linked to industry, practice and economy.

Based on the opinion of Jarvis (1999), professionals in practice could become aware of how to initiate research that is grounded in practice. To facilitate this, Kolb (1984) prescribes experiential learning model, which helps to reflect on practice (Schon, 1991; Moon, 1999) in a mental process that deals with unstructured problems with the intention of having an understanding of its configuration and significance through reflection and information processing (Moon, 1999) of engaging problem, collecting data, reinforcing with concepts and probably, embedding change in the four cardinal experiential learning model of Kolb (1984).

1.2.2 Rigour-Relevance Debate of Problem-Oriented Research

Important to this study is the consideration of the effects of the longstanding debate on the rigour-relevance balance of problem-oriented research and the position taken by this study. The rigour-relevance contest is occasioned by researchers working in silos or "incestuous close loop of scholarship" that argues for either rigour or relevance (Hambrick, 1994, p. 15). Traditionally, theory-oriented research is known to be highly skewed towards rigour while problem-oriented research is highly skewed towards relevance (Gulati 2007). In the previous section, the need for practice-based research has been noted in consideration of the nature of the problem being investigated and the habitat or natural environment of the

problem. It is necessary to now begin to visualise how to go about the research, that is, the process. One way is to consider the rigour-relevance balance.

Behavioural sciences traditionally borrowed its research process from the physical sciences wherein a research starts with a theory by working from the known to the unknown (Lawrence, 1992). This theory-oriented paradigm in behavioural science has been around for a while even though many researches in behavioural sciences now seem to defer to the problem-oriented paradigm. It is often argued that the adoption of the theory-oriented paradigm by behavioural sciences is a fundamental flaw because physical objects do not have voice unlike humans who can talk and provide data on what they experience and how they feel (Lawrence, 1992; Gulati, 2007). This is a significant difference and the arguments for the need of behavioural sciences to have more relevance than rigour according to Hambrick (1994). The process of research in physical sciences therefore appears to be antithetical to the problem-oriented or practice-based process. Lawrence (1992), while arguing for the need for research in behavioural sciences to follow the route of problem-oriented paradigm, lists the key probable advantages of problem-oriented approach to research as:

1. The high probability of developing not only usable findings but findings that are actually used.
2. Problem-oriented research is practical because it is easier to identify the most important problems.
3. When research is related to practice, it is easier to obtain site for field investigation and collection of data.
4. Problems always require the combined analysis at both the micro and macro levels for an appropriate understanding and resolution as provided by the problem-orientation research approach.
5. There is the strong potential of discovering new and perhaps better organisational forms during problem-orientation research process.
6. A problem-orientation research provides strong means of identifying gaps in knowledge and theory.

Gulati (2007) however agues for a compromise between rigour and relevance by demonstrating that research should not seek for either rigour or relevance but for both, in a win-win situation rather than a zero-sum game. Vermeulen (2005) refers to this as a way whereby rigour and relevance are synthesized at a much higher level in order to find a

balance between them. To achieve this synergy of rigour and relevance, Gulati (2007) offers the following steps for problem-oriented researchers:

> Step 1: Rely on real-world or practice problems to drive research.
>
> Step 2: Experiment theories using real-life and experienced participants
>
> Step 3: Ground ideas in existing theories and consequently build new theories.
>
> Step 4: Appreciate and synthesize the dialectics between theory and phenomenon by using theory to understand the subtle aspect of phenomenon while using phenomenon to illuminate the boundaries of theory.
>
> Step 5: Become "bilingual interpreters" by operating as translators and co-creators of knowledge with practitioners.

Building on the foregoing, this study defers to the views of Lawrence (1992) and Gulati (2007), which jointly seek to recognise the importance of making research relevant to practice while maintaining appropriate balance between rigour and relevance. Rather than commencing with theory as wont to do for conventional research, this study will commence with the identification and understanding of the problem before the collection of relevant data and structuring the data with relevant models and theories.

1.2.3 The Trigger for the Study

Reflecting on the activities of a quantity surveying (QS) and project management firm, a recent project commission of the consultancy firm by a tertiary educational institution came to focus. After a preliminary meeting, the firm was selected as the quantity surveyor for a 500-seat lecture theatre and was asked to provide initial cost information based on cost per seat for incorporation in the budget. There were no drawings or other specification documents for the building yet, the QS firm was able to produce initial cost advice by relying on data from previous similar projects executed in the not too distant past. After the submission of the initial cost advice, there were no further communication from the client for several months and, naturally the firm assumed, this could be an indication that the project was not considered in the client capital budget and thus its life had come to an end. However, in this particular instance, that was not the case.

Several months after the initial meeting, all the consultants were invited to the office of the head of the tertiary educational institution for another round of meetings with the officials from the institution. During the course of this meeting, the consultants were informed that they have now been appointed, based on the initial selection, for the 500-seat lecture theatre. Appointment letters were distributed after which the institution appealed to all the consultants to work within one week to produce and submit all tender documents even though they knew that it was a near impossibility hence, the reason why the documents submission date was tactically omitted on the letter of commission (see Appendix A, p. 292). Based on previous experience on a similar project devoid of the pressures exerted in this context, about four weeks would have been required to design and produce the tender documents using the traditional system of procurement hence; the consultants were shocked at the requested timeframe of one week. And in every practicality, this timeframe was unreasonable.

Different ideas may be generated on how to respond to this challenge. Should the firm employ more staff to prepare the documents? Or should the firm consider subletting part of the documentation to other professional colleagues? These and other options need to be evaluated before work commences. As a taster, how convenient is it for the firm to employ more staff simply because of one or two additional jobs without any assurance of a continuous inflow of jobs to engage the staff? Hence, the initial question may require a deep consideration of the future workflow opportunities. Even if the QS firm engages more hands but the other consultants like the architect and the engineers are unable to provide their drawings on time, it is likely to be an unproductive exercise for the QS firm. The idea of subletting part of the job to other consultants may require the firm to consider its position in a very competitive market alongside the likelihood of being able to retain the client for future commissions. In other words, would the firm be interested in promoting its competitor at its own detriment? It is doubtful. With increasing competition in the consulting services and a dearth of commissions, it also appears not to be a wise decision to argue delivery time with the tertiary educational institution but to find other ways outside the ones listed above in actualising the client's demand.

In this particular case in context, the architect took three days to develop presentable designs; the engineers subsequently took a further three days to produce the structural, mechanical and electrical drawings; leaving the quantity surveyor with 24 hours only to perform the difficult task of preparing a bill of quantities for the project. Such a task is impossible to complete within 24 hours if the practice is to safeguard the client from

contractual claims due to production errors. Quality should be the watchword of professionalism. With the best of efforts through a strategy that experimented with new ways of working, the quantity surveyors accelerated their operations producing the required documentation in four days. Even with this accelerated pace; the firm submitted the documents three days late. However, the procuring agency was lucky to get approval from the relevant government establishment for budgeting and for procurement. Normally, the approval could have been denied due to lateness.

1.2.4 Reflecting on the Trigger

This experience triggered the need to reflect on previous, often not noted, similar experiences on other projects where consultants were put under intense pressure to perform under very short pre-contract procurement timelines. Moon (1999) argues for the use of reflection when confronted with ill structured or messy problems (Rittel and Webber, 1972) as it provides a way to mentally process unstructured information thereby providing opportunity for an informed understanding and resolution steeped in experience. Realin (2008) refers to the critical reflective practitioner and the need to be apolitical or non-ideological but being critical and focused in conducting a genuine enquiry by juxtaposing the current situation with historical and similar experiences. Both authors however build on Dewey's (1933) ideas of how people think. Could it be inferred therefore that successful consultants working under compressed timelines are able to meet client's demand by some act of process improvement or innovation? Probably.

1.2.5 Procurement Regulation

As from 2007, the Public Procurement Act (PPA 2007) provides a legal framework guiding all public procurement processes in Government Ministries, Departments and Agencies (MDAs) in Nigeria. Although the procurement planning mentioned in the trigger case does not appear to meet the basic requirements of the procurement planning framework stipulated by the Nigerian Bureau for Public Procurement (BPP) in its procurement regulation, this appears to be how most government establishments execute their projects irrespective of timelines stated in advertisements published in the newspapers. These advertisements generally give the impression of working within the necessary timeframe but it appears to be more in theory than in practice. For example, Nwachukwu (2016) quotes engineer Abdul Mamman, a leading Nigerian procurement specialist, in an interview saying that:

> Under the public sector, there is this general belief to the citizenry that procurement decisions in the MDAs are not done with the stipulated processes and procedures, that some persons are being favoured to the detriment of others. They look at it as if there is usually an internal arrangement and it's just to fulfil all righteousness that you see advertorials being made.

Also, the Procurement Procedures Manual (2012, p. 4) refers to the importance of timeliness by recognizing that, "the quality, timeliness, suitability and affordability of those procured inputs can largely determine whether the public investments will succeed or fail". Of course, timeliness could be inferred to mean "the appropriate time" (Hedaa and Tornroos, 2001; Ramo, 2002) rather than the reduced time. On the same token, while attempting to shorten the procurement process, it is important to note that allotment of inadequate time to prepare the key contract documents may affect the quality and hence reliability of such documents. Based on the experience of a previously executed project of the same nature and magnitude and where there were no unnecessary pressures for compressed timelines, about four weeks would have been required by the consultants to design and produce the tender documents for a 500-seat lecture theatre. However, as stated in the case in context, about a quarter of the time was actually allowed.

The private sector in Nigeria appears to embrace a different and reliable procurement planning approach that puts value for money at the centre of project pre-contract procurement planning. Nwachukwu (2016) echoes this viewpoint quoting engineer Abdul Mamman, a procurement specialist that, "on the other hand, the private sector is more organised than the public sector". Although government budgets indicate the volume and value of capital expenditure particularly on construction projects in the public sector in Nigeria, there appears to be no reliable statistics to show the volume of construction projects initiated in the private sector. Nevertheless, and judging from the way government uses the construction industry to regulate the whole economy through controlled infusion of funds into construction projects during periods of economic booms and downturns, it could be inferred that the volume and value of privately driven projects in Nigeria are very low in proportion to that of public sector construction projects. The public sector consequently appears to be the major promoter of construction and built asset. This therefore supports the need for putting increasing attention on public sector projects and why it is justifiable to reflect mainly on public projects in this study.

and To further investigate the position that public sector projects are not given adequate pre-contract timeline and to accommodate the views of Lawrence (1992, p. 140) who advises on the need to do some "initial field scouting" at this stage, the issue was discussed with some professional quantity surveyors who have wide experiences on public sector projects procurement. Most of the quantity surveyors whose views were sought confirmed experiences of compressed timelines. From the foregoing personal experience and the experiences of peers, it therefore appears that the informal procurement system may actually be a systemic, ill structured or messy problem (Rittel and Webber, 1972) that needs to be further investigated.

1.2.6 Attempts at Solution

Of interest in this study however is how consultants have been able to address this issue and consequently satisfy their clients. Suffice it to say that interested consultants on these projects may do well by putting in place strategies and tactics that would enable them to respond to the *actual* procurement process rather than waiting for the *ideal* process that would provide for adequate timeline. Innovation has been suggested as a way of improving performance in professional service firms (Barrett *et al*., 2008; Garcia-Morales *et al*., 2008) but according to Latham (1994), Sundbo (1997) and Egan (1998), there are other general management improvement or organisational learning techniques like total quality management and Toyota Kata that could be employed to improve efficiency within professional service firms.

Sundbo (1997) opines that although both innovation and organisational learning aim at improving the performance of any organisation in the three goals of customer service, good working environment for the employees and profit for the owners (Maister, 2003), they are however separate phenomena that operate from different theoretical perspectives. While the details of the arguments would be provided in Chapter 2, suffice it to say that an organisational learning process is a development process adopted when there is enough time for learning and the problems at stake are less than complex (Sundbo, 1997). On the same note, innovation, which creates jumps, is required when there is not enough time for learning and where the problem is very complex in nature (Sundbo, 1997). This understanding underlies the preliminary consideration of innovation as the way to unearth the pre-contract compressed timelines problem. Compressed timeline may be seen as a complex challenge in a scenario that has not enough time for learning. This requires a jump to a different platform for solution, the extreme of which is referred to as radical or

disruptive innovation (Sundbo, 1997; Christensen, 2003). This is most probably because of the inherent shock or stimulus that normally accompanies very complex problems (Van de Ven *et al.,* 2008).

An appraisal by Wolstenholme (2009) opines that not much has been achieved through several initiatives in how innovation could be beneficial in the construction industry with particular reference to effectiveness and efficiency in the sourcing and deployment of resource inputs. The new initiatives of the UK government in working in partnership with the industry christened, "Construction 2025" (HM Government, 2013) is an initiative that seeks British leadership in global construction market through efficiency and effectiveness and by paying strong attention to *people*, *smartness*, *sustainability*, *growth* and *leadership*. This initiative provides new ideas and strategy in construction innovation. Whether the general process improvement techniques like organisational learning are adequate or not to address the compressed timelines during pre-contract documentation are issues to be investigated in Chapter 2. However, in a rapidly changing environment, Garcia-Morales *et al*. (2008) and Kissi (2012) see innovation as the strategy that may provide appropriate solution.

1.2.7 The Budget Bottleneck

Government Ministries, Departments and Agencies (MDAs) that are the project promoters appear to be constrained and incapable of changing this "unspoken rule" (clients giving shorter timelines than advertised) of procurement due to the complex budgeting and approval process of the Federal Government of Nigeria. Because of this clumsy and inefficient budgeting system, a great deal of time is lost during the annual budgeting process. And this scenario seems to constrain the MDAs to getting their projects executed within a timeframe of about six months in a fiscal year of twelve months (Ekeocha, 2012). Perhaps this may be a pointer to why the MDAs could not afford to give consultants enough time to prepare the pre-contract documents. Having wasted so much time during the political process of budget appropriation, there is no gainsaying the fact that the lost time would present problems and bottlenecks to the procurement process. For instance, a quick check on the budgeting and appropriation timeline of the Federal Government of Nigeria between 2000 and 2012 is shown on Table 1.1 while the approval timeline between 2013 and 2018 is shown on Table 1.2.

Both tables present significant evidence to demonstrate that a budget that was made and submitted by the executive arm of Government to the National Assembly for appropriation for a succeeding year is not usually approved until between April and May of the year within when the budget was to be executed. In other words, close to half of the year is passed before the budget is approved and appropriated. Hence, projects that were to be executed within a 12-month timeline are then forced to be executed within about half of that timeline. The rush to consequently initiate the approved projects under the capital expenditure appears to leave no room for the ideal timelines in the procurement process.

Table 1.1: Time Frame Showing Federal Budget Preparation and Enactment 2000-2012.

Fiscal Year	Date the National Assembly received Estimates from the President (A)	Date Approved Estimates was sent to the President for Assent (B)	Date the President Assented to Budget (C)	Time Frame between President's Presentation and Signature (D) = (C-A)	Time Lag between 1st January and date of President's Assent (E) = (C-1st Jan.)
2000	24 Nov 1999	14 Apr 2000	5 May 2000	5 months, 11 days	4 months, 5 days
2001	9 Nov 2000	21 Dec 2000	21 Dec 2000	1 month, 12 days	Nil
2002	7 Nov 2001	28 Mar 2002	28 Mar 2002	4 months, 21 days	2 months, 28 days
2003	20 Nov 2002	11 Mar 2003	10 Apr 2003	4 months, 21 days	3 months, 10 days
2004	18 Dec 2003	20 Apr 2004	21 Apr 2004	4 months, 3 days	3 months, 21 days
2005	12 Oct 2004	18 Mar 2005	12 Apr 2005	6 months	3 months, 12 days
2006	6 Dec 2005	21 Feb 2006	22 Apr 2006	2 months, 16 days	3 months, 22 days
2007	6 Oct 2006	22 Dec 2006	22 Dec 2006	2 months, 12 days	Nil
2008	8 Nov 2007	27 Mar 2008	14 Apr 2008	5 months, 7 days	3 months, 14 days
2009	2 Dec 2008	3 Feb 2009	10 Mar 2009	3 months, 8 days	2 months, 10 days
2010	23 Nov 2009	25 Mar 2010	22 Apr 2010	4 months, 29 days	3 months, 22 days
2011	15 Dec 2010	25 May 2011	26 May 2011	5 months, 11 days	4 months, 26 days
2012	13 Dec 2011	15 Mar 2012	13 Apr 2012	4 months	3 months, 13 days

Source: Ekeocha (2012)

Table 1.2: Time Frame Showing Federal Budget Preparation and Enactment 2013-2018.

Fiscal Year	Date the National Assembly received Estimates from the President (A)	Date Approved Estimates was sent to the President for Assent (B)	Date the President Assented to Budget (C)	Time Frame between President's Presentation and Signature (D) = (C-A)	Time Lag between 1st January and date of President's Assent (E) = (C-1st Jan.)
2013	10 Oct 2012	20 Dec 2012	20 Dec 2012	2 months, 11 days	Nil
2014	19 Dec 2013	23 May 2014	23 May 2014	5 month, 5 days	4 months, 23 days
2015	17 Dec 2014	28 Apr 2015	28 Apr 2015	4 months, 12 days	3 months, 28 days
2016	22 Dec 2015	23 Mar 2016	6 May 2016	4 months, 15 day	4 months, 6 days
2017	14 Dec 2016	19 May 2017	12 June 2017	5 months, 29 days	5 months, 12 days
2018	07 Nov 2017	16 May 2018	20 June 2018	7 months, 13 days	5 months, 20 days

Source: Desktop Research (Nigerian Online Newspapers)

1.2.8 Need for Innovation Response from QS firms

From evidences of what happened during the budgeting and appropriation process in Nigeria for several years as shown on Tables 1.1 and 1.2, there appears to be no concrete efforts towards effecting any change of process. Since the 2018 budget reflects the status quo of budget appropriation delays, the general situation in Nigeria could be rightly described as chronic having persisted for over 19 years. It appears to have become a culture, "the taken-for-granted assumptions and routines" (Johnson and Scholes, 1999, p. 58), which defines the latent ways in which things are done in an organisation. It therefore seems that consulting firms in the built environment have to find new and effective ways of responding to the lack of adequate timeline for pre-contract process. Given the knock-on effects that could result from the impacts of a change in a significant activity like timeline, adequate frameworks need to be put in place to address the resultant effects on poor quality of projects, cost overruns, delays and procurement of a final product that may not be fit for purpose. And perhaps these are some of the reasons why there is so much dissatisfaction with the processes and products of the construction industry in Nigeria (Anago, 1999; Oladapo, 2000; Aibinu and Jagboro, 2002).

However, the concerns of QS firms, lacking in capacity to influence the big *political* picture of the budgetary and appropriation process at the Federal Government level, would be on how to develop strategies for responding to the changing pre-contract procurement planning timeline. Maister (2003, p. 230) opines that strategic development in professional service firms is not about forecasting the future events to be executed by the firm and how to go about it rather, it is "to create the responsive organisation, to put in place a set of operating procedures which force the practitioners to listen to their marketplace on an on-going basis". They should listen to their customers if they wish to remain in business. Firms should therefore be concerned with how to respond effectively and efficiently in meeting the needs of their clients. Hence, QS firms may need to innovate and respond to the needs of the client effectively and efficiently so as to be able to survive.

Consequently, it appears that the need to innovate is thrust onto the professional service firm through the demands of the clients or market rather than it emerging from a systematic internal planning process (Maister, 2003). As a result, most firms that innovate are actually oblivious to the fact that they are innovating as their innovations are hidden in their operations and are therefore not being identified and tracked in an explicit and systematic way that would allow them to maximise the beneficial results that such innovations may bring to the organisation (Barrett *et al*., 2007).

Within the Nigerian context, the extent of innovation in professional service firms appears to be fuzzy as there are no in-depth studies of innovation in firms (Jegede *et al*., 2012). Although there are some claims of minimal ICT adoption in QS firms (Oluwatayo and Amole, 2012; Ibironke *et al.*, 2011; Oladapo, 2007; Oyediran and Odusami, 2005) these are not discussed within the context of innovation. Both Moohamed *et al.* (2014) and Onyeagam *et al.* (2019) who discuss innovation, only sought to classify firms along Rogers's (1995) *Innovation Diffusion Theory* without showing details of how these firms actually innovate. A deliberate consideration of client relationship and how it has shaped the activities and operations of the firm could therefore be a pointer to how the firm has been innovative and tacitly responding to the needs of the client and the marketplace. This is in line with the call of Aouad *et al.* (2010) for purposeful new research into understanding different types, levels and points of innovation in professional firm's operations. This study is therefore designed, in part, to address some of these issues, gaps and problems.

1.3 Research Aim and Objectives

The aim of this research is to investigate how QS practice firms innovate and how they respond, through innovation, to the pressures of compressed pre-contract timelines during pre-contract documentation in Nigeria. The main objectives of the study are:

1. To review existing literature on timing, process improvement and innovation as they relate to compressed time demands during pre-contract practice.
2. To situate this study within the framework of practice-led research in the built environment and propose a theoretical model for practice-based doctoral research.
3. To examine how QS firms innovate in practice and develop a model of innovation process in QS firms.
4. To explore how QS firms, through innovation, do effectively respond to the pressures of compressed pre-contract timelines during pre-contract documentation.
5. To propose recommendations for action for QS practitioners and policy-makers in Nigeria.

1.4 Scope of the Research

The problem being investigated is how QS firms are able to respond, through innovation, to compressed pre-contract timelines during pre-contract documentation in the construction industry. The essence therefore is about the innovation in the response of QS firms. Of course, there may be are other ways that QS firms may improve their capacities to respond to client's demand for faster services that do not meet the definition of innovation. These options of capacity building and process improvements are discussed in subsequent chapters. Although literature shows that compressed timelines happen at varying levels of intensity and significance to projects all over the world, the focus of this study is on projects executed in Nigeria and all empirical data is from Nigeria. Finally, empirical data gathered are restricted to pre-contract documentation and do not include data at post-contract operations.

1.5 Structure of the Thesis

The thesis is structured in Chapters as presented in Figure 1.1. Chapter 1, entitled "Introduction" considers practice background and research context, the research aim and objectives and the scope of the investigation. Chapter 2 discusses the two concepts of time

and timing, Chronos and Kairos, and the key process improvement techniques, which the QS firm could consider in finding solutions to the phenomenon of compressed timelines in QS firms. Chapter 3, entitled “Innovation” discusses innovation from the literature by first considering it in the wider concept but later narrowing down to the construction industry. Finally, the different models of innovation in construction are discussed.

Chapter 4, entitled “Professional Service Firms” discusses the professional service firm within the context of innovation. It discusses the key goals of the professional service firm and the key competencies required in meeting those goals. Finally, it discusses the nature and structure of QS firms in Nigeria. Chapter 5 considers pre-contract practices of the various procurement systems in Nigeria. It also discusses the client briefing process and its effects on compressed timelines during the pre-contract process. Chapter 6, entitled “Research Methodology: The Fundamentals” discusses the research methodology following an identification of the research problem and therefore justifies the research methodology that is applicable to investigating the research problem.

Chapter 7 reviews what constitutes practice-based research in the built environment and presents an argument for a theoretical model to guide the study. Chapter 8 presents the report of the exploratory study conducted to firm up the investigation. Chapter 9 presents the results and findings of the interviews conducted, documents viewed and participant observation in the six firms. Chapter 10 discusses the results presented in the previous chapter while Chapter 11, entitled “Conclusion and Recommendations” presents the key conclusions and offer recommendations for action by QS firms and policy makers in Nigeria.

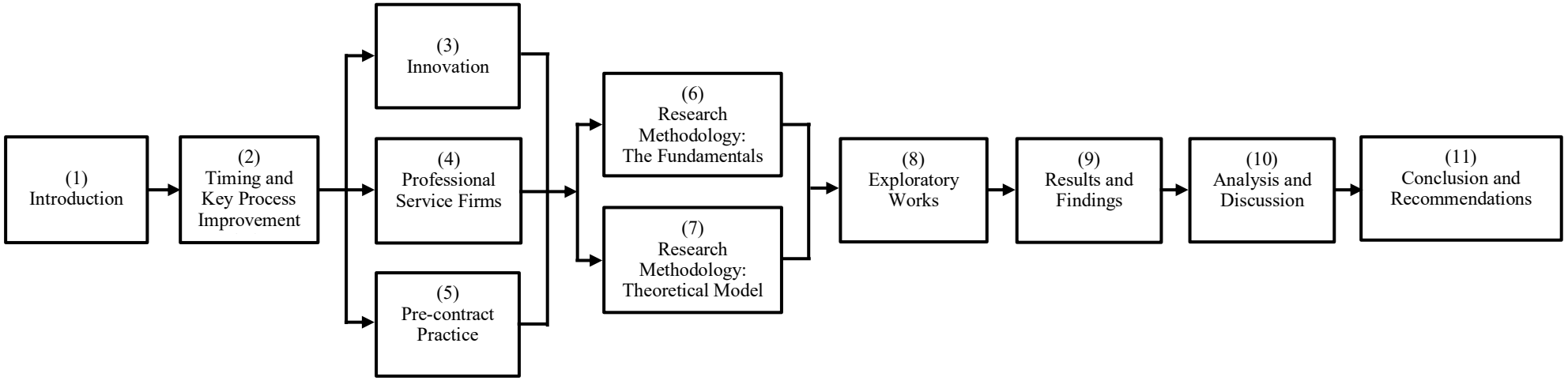


Figure 1.1: Structure of the Thesis

1.6 Summary

This chapter discussed the practice background to the study and grounded the problem in practice. Using arguments from the rigour-relevance debate, the chapter shows that practice-based research should find an appropriate balance along the rigour-relevance continuum by settling for a win-win rather than a zero-sum outcome. Using the trigger from a 500-seat lecture theatre, discussions recognized the fact that consultants within the Nigerian construction industry are faced with the pressure of compressed time demands during tender documentation. It attributed the primary causes of the problem to lack of adequate planning and also the perennial delays in the government's budgeting and appropriation process which in most times snowball into acute shortage of time for the entire procurement process. Having considered the process improvement techniques, the chapter hinted at innovation as a probable way of meeting up with this challenge. Subsequently, it presented the aim of the study as the investigation of how QS firms in Nigeria innovate and how they respond, through innovation, to the challenge of compressed time demands during pre-contract documentation. The chapter concluded by presenting the scope of the research and the structure of the thesis.

CHAPTER TWO

2.0 TIMING AND KEY PROCESS IMPROVEMENT TECHNIQUES

2.1 Introduction

At centre of this investigation is pre-contract timelines hence, it is important to also look at the different concepts of time and how they relate to the pre-contract timeline. The chapter provides the background discussion on time and timing through the consideration of the concepts of *Chronos* and *Kairos* and their relationships to compressed timelines and process improvement methods. This chapter also looks at the process improvement techniques in more detail and their relationships with the problem of compressed timelines. It considers the key process improvement methods in construction and professional service organisations towards recommending a particular one, to be used in investigating the research problem, if necessary.

Ideas for process improvement developed from the manufacturing industry from the 1970s when Total Quality Management (TQM) was developed (Gershon, 2010). The major reasons for process improvements are identified by Rashid and Ahmad (2013, p. 45) as, "to achieve customer demands and satisfaction and maintain a competitive position in the market". This is a view which other writers like Kirkham *et al.* (2014) fully agree with. Gershon (2010, p. 61) opines that there is a plethora of techniques towards "improving the quality of processes and maintaining acceptable levels of performance quality" within organisations. These techniques have become competing techniques as each consulting firm believes its technique is the best (Gershon, 2010). Although there are many similarities in their features, these techniques differed in effectiveness (Gershon, 2010; Rashid and Ahmad, 2013) hence, the experiences of users may be very crucial.

In deciding which technique to use in a particular situation, Gershon (2010) argues for a scoring system that compares how each technique is able to satisfy a set of implementation criteria. These criteria may be, "technical, operational, administrative and organisational" (Rashid and Ahmad, 2013, p. 45). It is also a good idea to look at the strengths and weaknesses of each technique before making a selection (Rashid and Ahmad, 2013). However, in a study of prioritisation of improvement techniques in European manufacturing organisations, Kirkham *et al.* (2014) recommend reliance on the past

experiences of organisations in the use of the different types of process improvement techniques before making a prioritised selection. They reason that the technical, operational, administrative and organisational criteria are expressed in the experience of the organisation. Kirkham *et al.* (2014) therefore conclude in their study that Six Sigma, TQM and Lean Manufacturing (e.g. Toyota Kata) are the most commonly used process improvement techniques, based on experience and objective measures. This study therefore relies on the conclusions of Kirkham *et al.* (2014) and consequently adopts the three techniques (Six Sigma, TQM and Toyota Kata) for review for possible relevance to compressed timelines on construction projects.

Like in manufacturing, process improvement is also a serious issue in the construction industry. Latham (1994), Egan (1998), Wolstenholme (2009), HM Government (2013) and Farmer (2016) decry the lack of efficiency and effectiveness in construction processes and argue for the need for process improvement techniques in construction. In addition to TQM and other process improvement techniques in manufacturing, the construction industry has suggested innovation (Latham, 1994; Egan, 1998; Barrett *et al.*, 2007; Barrett *et al.*, 2008; Wolstenholme, 2009; HM Government, 2013; Farmer, 2016) and building information modelling (BIM) (Arayici *et al.*, 2011; Pittard and Sell, 2016; RICS, 2017; Uduma-Olugu, 2017; Ahuja *et al.*, 2017) as techniques that can improve the process of construction services and deliverables. Therefore, in addition to Six Sigma, TQM and Toyota Kata as previously stated, Innovation and BIM are to be discussed further for possible relevance to compressed timelines on construction projects.

2.2 Different Views of Time: The Chronos and Kairos

2.2.1 Introduction

A key issue in this study is that of compressed timeline during the pre-contract documentation in the Nigerian construction industry. Consequently, there is the need to look at what *time* means and the different viewpoints on it. This will enable the study to be properly situated in the context of time that the study envisages. The management of construction projects is generally related to time and timing. Time is operationalized through the development of programmes (Boyd and Madzima, 2017). There are other types of programmes like the Bar Chart, PERT and Critical Path Analysis that have been developed over the years through research and practice (Lock, 1996). Although these

programmes present timeframes and sequential activities indicating when activities and projects should be realised, the plethora of planned projects with many delays and sometimes abandonments (Anago, 1999; Boyd and Madzima, 2017) have called to question the reliability of either the programmes or the underlying assumptions upon which the programmes were developed (Davies, 1994).

2.2.2 Different Concepts of Time

Historically, ancient Greek had two ideas of time: *Chronos* and *Kairos*. Linear or quantitative timing originates from the concept of *Chronos*, the Greek god that the ancient Greek philosophers believe controls the sequential order of things (Hedaa and Tornroos, 2001). The word *chronology* subsequently took its origin from the philosophical thoughts on *Chronos* (Hedaa and Tornroos, 2001). Chronology is the science of measuring time by regular divisions into units (Hedaa and Tornroos, 2001). It is a rigid movement from a definitive past towards a definitive future without provisions for unforeseen circumstances along the way (Boyd and Madzima, 2017).

On the other hand, the Greek god *Kairos* is described as the intelligent god who controls the art of taking opportunity at the right moment. Ramo (2002) sees *Kairos* as intelligent action, which is beyond the character of mechanical timetables. *Kairos* therefore appears to have expansive capacity to deal with unforeseen circumstances and is therefore tacit or qualitative in nature. Traditional management theory is about autonomous actions within organised and regulated routines but current perspectives consider heteronomous and interdependent actions due to the increasing turbulence in organisations particularly in project based organisations (Hedaa and Tornroos, 2001; Ramo, 2002). According to Hedaa and Tornroos (2001, p. 7), "*Kairology* denotes a theory of timing under conditions of uncertainty".

2.2.3 Time in Construction Process

The idea of time in construction delivery, in most cases has been allied with the linear viewpoint of time, which sees time as a chronology of sequential events/activities that have been planned to occur at respective points. Construction practitioners seem to have only one generic idea of time (Boyd and Madzima, 2017) and this is made very obvious in the many questions and decisions within the industry. This single concept of time is described

as linear or quantitative and mostly seen as limited or inadequate (Smith, 1969; Boyd and Madzima, 2017).

For instance, common questions like “how fast?”, “how frequent?” and “how old?” (Smith, 1969, p. 1) which are frequently being asked during construction project delivery are manifestations of the linear paradigm of time. This linear representation of time according to Boyd and Madzima (2017) presents anxiety and uncertainty on projects as any offset from the linear alignment becomes problematic. However, when questions like “when” and “at what time” are asked on a project, it brings some flexibility rather than anxiety to the actors and enables the application of intelligence in arriving at a solution. As time is a top item on the list of causes of poor delivery of construction projects and in most cases being equated with loss of money (Boyd and Madzima, 2017), its relevance in construction project delivery can therefore not be taken lightly.

Recently however, construction researchers, prime of which is Chan (2012) have queried the industry’s unflinching reliance on the single viewpoint of linearity and challenged researchers and practitioners alike to research into the richer notion of time so as to apply its duality to the construction delivery process (Boyd and Madzima, 2017). In his argument, Chan (2012) charges that:

> time cannot be simply represented as a homogeneous numerical order. Rather, researchers must open up potential questions about the multiplicity (i.e. heterogeneity and continuity) of the qualitative experiences of time…. which has hitherto been taken for granted in the field of construction management.

The major drawback of linearity, or what Ramo (2002) also refer to as *clock-time*, is its inability to deal with unplanned situation or change (Ramo, 2002; Boyd and Madzima, 2017). Change and contingencies, like budgetary and funding delays, must happen in construction delivery and the lack of consideration for them in the chronology of time is its main undoing. Ramo (2002) therefore opines that the temporary nature of a construction project makes it susceptible to unplanned changes hence, the need for a different time paradigm to accommodate the inherent contingencies.

Kairos on projects refers to the appropriate time for an event or activity. It is tacit in nature and requires intelligent action at the right moment (Ramo, 2002). It is neither about the past nor of the future but about what could be done at the right or present moment within

the context of its unforeseen events. The right time is actually what matters most (Ramos, 2002; Boyd and Madzima, 2017). There might have been delays in the *Chronos* but the *Kairos* steps in to apply solutions that harmonise the contingencies with the planned.

Drucker (1974) propose the duality of time and differentiate between *efficiency* and *effectiveness* with the former relating to how *fast* a task/activity could be accomplished while the latter relates to how *well* the task/activity could be accomplished. This argument was further stretched by Barrett (2012) who envisions that "doing things right" (*efficiency*) on one hand and "doing the right things" (*effectiveness*) and not just things that are measurable on the other hand, have enormous potentials of bringing a lot of benefits and value to the construction industry. Ramo (2002, p. 572) supports the duality nature of time by asserting that:

> the imperative of doing things right has its clear logic in the creation of smooth, swift and thrifty flows of goods and services…. however, such ideas of efficiency and doing things right presupposes management and improvement of what already exists and what is already known…. evidence from the last century indicates that a partisan focus on efficiency tends to restrain innovativeness and awareness of changing demand.

The above opinion seems to suggest that *Chronos* deals with predictable process where process improvement techniques could be applied but it lacks the capacity to deal with unforeseen circumstances like delay contingencies during pre-contract documentation. Since unforeseen events along the pre-contract timelines are not known *a priori*, it seems to suggest therefore that *Chronos* is incapable of addressing the issues of innovation in project delivery. Therefore, using clock-time rule for construction project delivery with its plethora of unplanned changes could probably lead to epistemic error (Ramo, 2002).

It therefore appears that a compromise needs to be found in harmonising the positions on both sides of the chasm of time duality by bringing in the efficiency and effectiveness viewpoints, all together on projects. Ramo (2002) opines that management, particularly of project organisations, requires both efficiency and effectiveness. Successful projects should be planned with limited time and uniquely complex implementation that has consideration for unforeseen circumstances, which require both *Chronos* and *Kairos* (Ramo, 2002). In the words of Boyd and Madzima (2017, p. 813), "clients, project managers and project professionals need a much richer and dynamic view of time that balances *Kairos* and *Chronos* to deliver better management of projects". Also, Ramo

(2002) submits that the concepts of *Chronos* and *Kairos* should not be taken as mutually exclusive but as complementary concepts.

Procurement process, particularly during the pre-contract documentation requires efficiency but more importantly effectiveness. After all, what is the value of doing things right or fast if the right thing is not being done? It seems to indicate that for value to accrue to the procurement process, the right thing must first be done and this is why it is argued here that the tacit or qualitative concept of time, *Kairos*, should be given priority in understanding the innovative ways in which quantity surveying (QS) firms respond to compressed time demands during the pre-contract documentation of the procurement process. This requires taking the opportunity at the moment by providing the necessary actions.

Kairos is about taking opportunity at the right moment and this is the intention of this study in understanding what a QS firm would do knowing fully well that the quantitative time has been breached by different contingencies like the slow budgetary process, inability of the client to make up his/her mind on what he/she actually wants by providing a reliable and timely client brief, funding delays and legal encumbrances. The QS firm must therefore decide, within the context of the existing challenges, and take the best opportunity available on how to respond in a way that provides value to the procurement process. From the discussions so far, it appears that this response should be highly skewed towards *Kairos* in a negotiated consideration on a *Chronos*-*Kairos* continuum.

2.3 Total Quality Management

2.3.1 Introduction

Serpell and Alarcon (1998) see process improvement within the context of reduction in waste and elimination of all activities that add no value to the construction procurement process. Arditi and Gunaydin (1997) refer to the wasted huge expenditures of time, money, materials and labour in construction due to the non-availability or inefficient quality management system. Total quality management (TQM) is therefore one of the process improvement techniques in the construction industry. Stewart and Spencer (2006) argue that the embrace of total quality management in the construction industry is a way of reducing waste in resources and improving the market competitiveness of firms. Quality in

construction is defined as "meeting the legal, aesthetics and functional requirements of a project" (Arditi and Gunaydin, 1997, p. 235). While the legal aspects deal with the procurement process and the rights and responsibilities of the parties to the contract, aesthetics and functional requirements relate to the satisfaction that the client derives from the use of the construction products or deliverables.

Two key concepts that require understanding are quality assurance and quality control. While the former refers to a set of activities that should be followed in assuring quality in an organisation or project, the latter is the process of implementing the former (Arditi and Gunaydin, 1997). The United States Department of Defense (1988, p. 1) defines TQM as:

> a strategy for continuously improving performance at every level, and in all areas of responsibility. It combines fundamental management techniques, existing improvement efforts and specialised technical tools under a disciplined structure focused on continuously improving all processes.

The above definition is in agreement with Rad (2006, p. 607) who sees TQM as an organisational culture, which "supports the constant attainment of customer satisfaction through an integrated system of techniques and tools". TQM is therefore a philosophy, which enables the management of an organisation to the satisfaction of stakeholders (Dale, 2014).

2.3.2 Quality Management Principles

Dale (2014) recommends the BS EN ISO 9000 eight quality management principles that have to underpin every TQM initiative. From the discussion of these principles, it should be clear if TQM could be applied to resolve the problem of compressed timelines during the pre-contract documentation in the Nigerian construction industry.

1. *Customer Focus*: Organisations do not exist for themselves but for the satisfaction of the needs of their customers or society (Kast and Rosenzweig, 1985; Johnson and Scholes, 1999, Hughes and Hughes, 2013). As a primary goal, customer focus is key towards understanding customer needs and how to satisfy them. Every TQM initiative therefore should have customer satisfaction as a major goal.
2. *Leadership*: Leadership dictates the direction of the organisation in TQM. It creates the environment that encourages commitment so that people can be completely

involved in realising the TQM objectives of the organisation. Without leadership commitment, it is doubtful if there can be any successful TQM initiative.

3. *Involvement of the People*: For a successful TQM initiative, the staff of the organisation must own the initiative and not seeing it as something they are forced to do. Leadership needs to ensure that the staff key into the TQM programme by being interested in it. This could be achieved if the staff are involved in the planning of the TQM programme. The leadership needs to communicate the programme to the staff at the early stages and also incorporate staff views and contributions into the final TQM programme.
4. *Process Approach*: The TQM programme should be managed as a process, which should be a series of actions taken sequentially to achieve a particular goal. These actions or activities are easier to manage as a process.
5. *System Approach to Management*: A system has an input, processing and output segments. Organising and managing interrelated processes as a system enables an organisation to achieve its goals in an efficient and effective way.
6. *Continuous Improvement*: A striking and permanent objective of TQM is continuous improvement. Both the leadership and the staff are jointly committed to the concept of continuous improvement.
7. *Factual Approach to Decision Making*: Analysis of factual quantitative data are done and conclusions drawn to aid effective decision making.
8. *Mutually beneficial Supplier Relationship*: The relationship between an organisation and its suppliers should be mutually beneficial.

Although measurement of performance enables the effects of TQM on organisations to be known, Pimentel and Major (2016) have shown how it is a difficult challenge to both researchers and practitioners alike to measure performance on TQM initiatives. There are some evidences that TQM has brought some advantages to organisational performance (Erikson and Hansson, 2003; Rad, 2006) however, there are growing criticisms of TQM due to its clear failures on some TQM initiatives in organisations (Pimentel and Major, 2016).

2.3.3 Discussion and Conclusion

Would TQM provide a platform to deal with the problem of compressed timelines during the pre-contract documentation? The answer requires the consideration of the nature of the problem and also that of TQM. TQM is a quality management technique that uses a systems approach to management and follows a sequential set of activities to achieve continuous improvement (Dale, 2014). However, the problem in context is unplanned and occurs during the procurement process as a result of the client's inability to plan and control the budgetary appropriation process and consequently, the pre-contract timelines. It is therefore more of a complex problem than a problem of sequential planning. Rittel and Webber (1972) refer to this type of problems as *wicked* problems or *messes*, which could not be resolved with any algorithmic process. The social complexity inherent in the dynamics of the problem therefore appears to make it inappropriate to be resolved through TQM application.

2.4 The Six Sigma

2.4.1 What is it?

The Six Sigma is a quality improvement system, which is defined variously depending on context. A practical or industry-based definition provided by a Six Sigma online platform is that Six Sigma is, "a disciplined, data-driven approach and methodology for eliminating defects in any process" (iSixSigma, 2017). Another practitioner definition is, "high-performance, data-driven approach to analysing the root causes of business problems and solving them" (Schroeder *et al.,* 2008, p. 537). However, a more theoretical definition based on grounded theory is given as, "an organised, parallel-meso structure to reduce variation in organisational processes by using improvement specialists, a structured method and performance metrics" (Schroeder *et al.,* 2008, p. 540).

2.4.2 Basic Methodology

Six Sigma uses two methodologies depending on the problem being addressed: DMAIC and DMADV. The DMAIC (define, measure, analyse, improve and control) methodology deals with improvement to existing product or process while DMADV (define, measure, analyse, design and verify) methodology is used for the development of new product or

process. Six Sigma is essentially for a manufacturing concern but can be applied to other business processes where improvement of the process is of prime concern.

2.4.3 Application in Construction

Saddled with the increasing problems of wastes, mistakes and rework in the construction industry pre-contract and post-contract processes (Latham, 1994; Egan, 1998) Stewart and Spencer (2006) see a great role for Six Sigma in construction. For a comprehensive cause of rework in construction please see Love, *et al.* (1999) and Fayek *et al.* (2003). The target in Six Sigma is to have a process in which 99.99966% of the opportunities to produce products are defect free. This translates into a maximum of 3.4 defective units in a million of units produced. The need of Six Sigma in construction could be gleaned from Love *et al*. (1999), Love (2002) and Love *et al*. (2008) to the effect that rework has considerable impact on the construction industry as a whole and could result in considerable loss of time with attendant cost implications. Based on figures from the industry, McDonald (2015, p. 1) suggests that "direct cost of rework contributes an average of 5% to the total construction costs" and that if overhead and other indirect costs are added to the direct cost, "the percentage of rework contribution to total construction costs can exceed 7.25% and reach as high as 12%".

2.4.4 The Key Roles

Quality management in previous initiatives were mostly practiced at the shop floor. However, a distinctive feature of Six Sigma is to make the process all pervasive throughout the whole fabric of the organisational processes hence, the creation of specific roles to ensure that the goal is realised. The key roles in Six Sigma implementation therefore are:

- *Executive Leadership* - This involves the CEO that gives the necessary active top-level management support required for Six Sigma to succeed across the entire organisation.
- *Champions* - These are responsible for the implementation of Six Sigma in the organisation. They devote their time in the organisation exclusively to the Six Sigma and also train the black belts.
- *Master Black* Belts - They are the in-house coaches who have overall responsibility for the successful operation of Six Sigma across all departments and functions of the organisation. They devote their time exclusively to Six Sigma implementation.

- *Black Belts* - Trained by the Master Black Belts, they are responsible for applying the Six Sigma to specific projects. They devote their time exclusively to Six Sigma implementation.
- *Green Belts* – Operating under the guidance of the Black Belts, they combine Six Sigma responsibilities with other responsibilities.

Schroeder *et al.* (2008) report the distinctive characteristics of the Six Sigma, as against previous quality improvement techniques, through the views of two top executives of a blue chip company. They see Six Sigma as a system of engaging crack specialists in problem solving. These crack specialists (otherwise called Black Belts) are statistics literate, appropriately trained and are engaged full-time on Six Sigma and how its methodology could be used to solving the identified problem so as to achieve a competitive edge. This appears to be a key distinction between Six Sigma and previous quality management techniques.

2.4.5 Structured Methodology

Figure 2.1 shows the DMAIC methodology of Six Sigma as presented by Stewart and Spencer (2006). The first of the five steps is to *define* the scope and involvement of the problem in context. This is closely followed by the *measurement* and collection of relevant data. The *analysis* of the data is by statistical tools. However, some commentators like Dale *et al.* (2000) and Stewart and Spencer (2006) are of the opinion that the technical nature of statistical analysis may discourage the wide use of any process improvement techniques that is significantly based on statistical tools like the Six Sigma. The next step is to determine how the organisation can *improve* the process in order to optimise. Finally, and in order to prevent a reoccurrence of the problem, a *control* measure is put in place.

2.4.6 Discussion and Conclusion

Although the Six Sigma has the potential of being used in construction to eliminate wastes, mistakes and rework in both materials and processes (Stewart and Spencer, 2006), it is doubtful if it could be of much relevance within the context of compressed timelines during pre-contract documentation in Nigeria. Compressed timelines of pre-contract documentation usually require revolutionary changes that go beyond continuous improvements. In the opinion of Maleyeff and Kaminsky (2002), Six Sigma is more of an

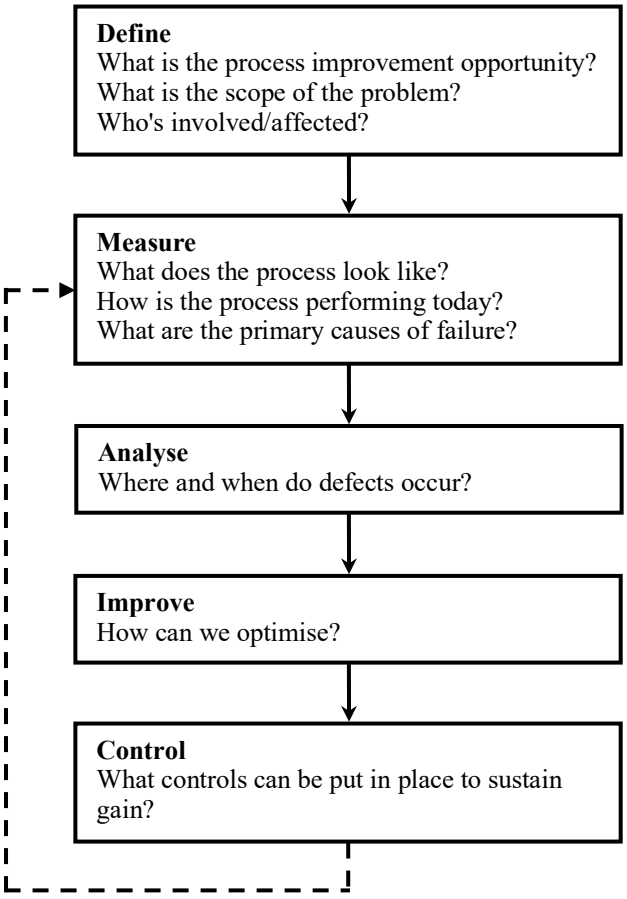


Figure 2.1: DMAIC Methodology of Six Sigma (Stewart and Spencer, 2006)

evolutionary rather than a revolutionary intervention. It takes its time to understand a problem, proffer solutions to it, apply the solution and institute necessary apparatus to prevent such problem from happening in the future. These factors appear to be antithesis to the nature of compressed timelines during pre-contract documentation in Nigeria where time is a very scarce commodity. In the light of the foregoing, Six Sigma may not be the appropriate technique for understanding and resolving the problem of compressed timelines for pre-contract documentation in the Nigerian construction industry.

2.5 Toyota Kata

2.5.1 Introduction

Rother (2009) documents *Toyota Kata* after carrying out a six-year extensive study of the operations of the Toyota Company. He demonstrates the guiding principles of managing

people in Toyota Company, which provides the momentum for continuous improvement through the technique of *Kata*. *Kata* in Japanese is a combination of movements and positions in many martial arts. The regular practice of these movements brings about proficiency, expertise and continuous improvement in that art. The same techniques were applied in Toyota organisation towards managing, developing and leading people.

2.5.2 Basic Methodology

Spear and Bowen (1999) previously examined the operations in Toyota Company, in a different 4-year investigation, and concluded that although the operations and work flow were very rigid, they were however extremely flexible in responding to customer demand. They opine that the rigidity of the system is what makes it flexible since every specification was considered as a hypothesis, which must follow the methodology of controlled experiment by being tested through performance. Rather than imposing this methodology on the workers, it is inbuilt and entrenched in them in a way that it brings out the tacit knowledge to bear on each situation while at the same time following the scientific process (Spear and Bowen, 1999).

2.5.3 The Key Rules and Fundamental Principle

Spear and Bowen (1999) prescribes four rules that guide the operations of Toyota production as:

1. That all works are highly specified to the smallest details possible so as not to allow for any ambiguities.
2. The customer-supplier interfaces are based on either yes or no. No personal opinion that could create ambiguities.
3. Product development and production processes are simple, clear and direct.
4. Every improvement is made based on the scientific method under the supervision of a coach at the lowest organisational level possible.

The fundamental principle of *Toyota Kata* is that human beings are what they do repeatedly whereby proficiency, expertise and excellence are consequently more of a function of habit rather than an act (Landry, 2015). When people perform a task repeatedly they become proficient in it. Landry (2015) gives some examples of such tasks as cycling, driving a car and typing. As one continues to practice these routines, one becomes so

proficient in it that to accomplish a particular task, like driving could be done effortlessly without any thought of it. Hence, "experienced drivers do not consciously think about controlling the vehicle, they simply focus on the road" (Landry 2015, p. 32).

2.5.4 The Key Roles

There are three basic roles in *Toyota Kata* methodology: the learner, the coach and the 2nd coach. These basic roles develop the mentoring structure, an important component of the methodology, which depends mostly on a one-on-one relationship that provides a reporting chain starting from the learner at the frontline up to the very top of the organisation. The learner is the one directly doing the work hands-on, seeing how the process is shaping out and interpreting the results. The coach gives direction by asking questions, which gets the learner thinking on the current and target conditions and how best to get the tasks accomplished. The coach does not do the job but assists the learner to do the job through probing questions, which refocuses the attention of the learner towards the target condition. Finally, the coach also needs guidance and this is given in the form of the 2nd coach. As work progresses, the role of the 2nd coach may diminish but it is not eliminated.

2.5.5 Structured Methodology

Figure 2.2 shows the Toyota Kata methodology wherein from the *Current Condition* or present state, the aim is to achieve the *Vision*, which is a long time goal that could be achieved after surmounting the *Ultimate Challenge*. However, the ultimate challenge could only be achieved not in a one fell-swoop but by breaking it down into smaller challenges and conquering each small challenge one at a time and progressing in a systematic and scientific way. Hence, the first huddle from the C*urrent Condition* is to aim at the nearest *Target Condition* by surmounting the first *Obstacle*. In surmounting the *Obstacle*, there is a cyclical model that is recommended for achieving continuous improvement and the lean outcome. This is the Plan, Do, Check and Act (PDCA) model as shown in Figure 2.3 All activities are first *planned* to the smallest details possible before *doing* the task. There is the need to *check* the progress of such tasks so as to *act* on it should any intervention or change be required. This process is continued in an iterative way until the *Ultimate Challenge* is surmounted and the *Vision* realised.

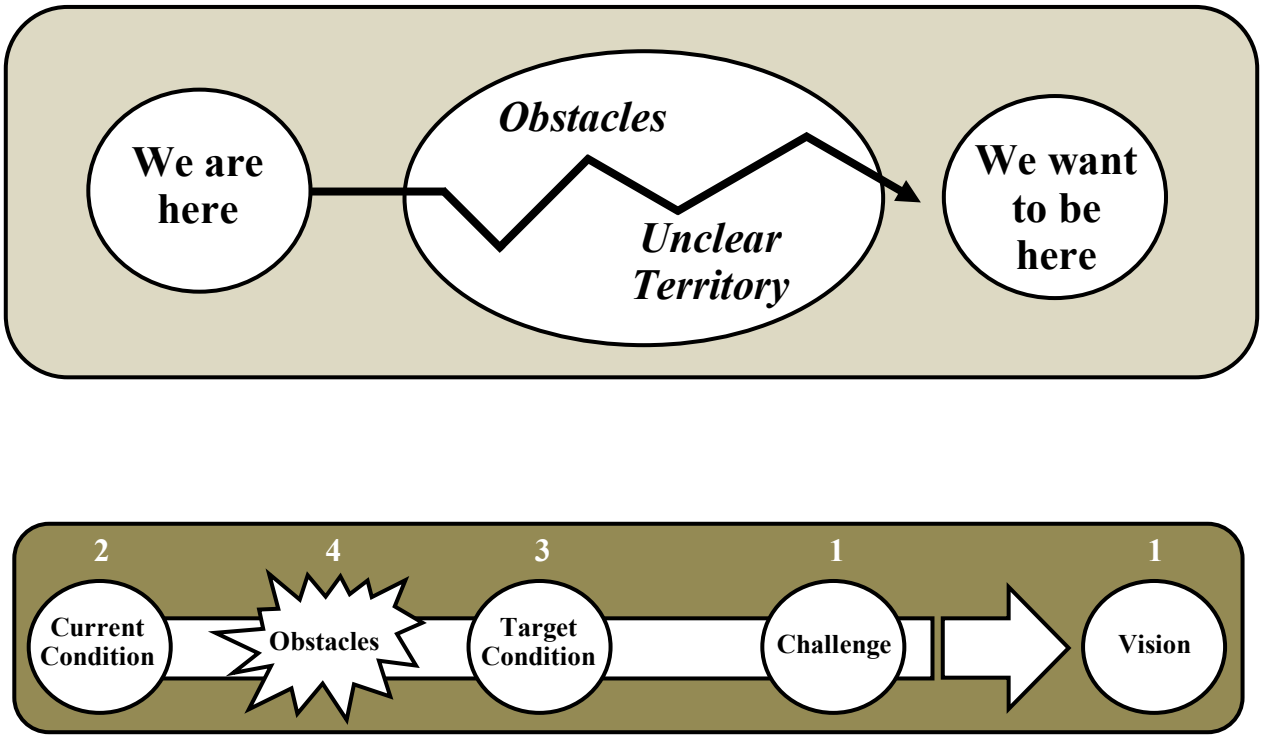


Figure 2.2: Toyota Kata Methodology (Landry, 2015)

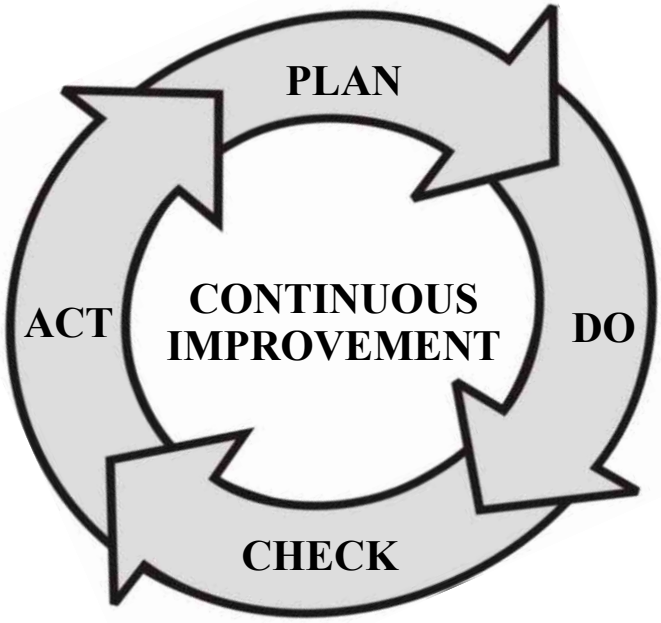


Figure 2.3: Plan, Do, Check and Act (PDCA) Model (Landry, 2015)

2.5.6 Discussion and Conclusion

The *Toyota Kata* methodology is very relevant where lean, waste-free and continuous improvement processes are required to deliver high quality products and services (Spear and Bowen, 1999; Rother, 2009; Landry, 2015). This requires the knowledge of a timeframe for the delivery of the product and an idea of what the customer requirements would be so as to plan towards it. It is a very rigid but slightly flexible process (Spear and Bowen, 1999). However, within the context of compressed timelines in the pre-contract documentation in the Nigerian construction industry, there is neither time allowed to plan for continuous improvement nor any idea that could aid the predictability of what the client timeline and other requirements would be because a lot of unforeseen circumstances come to impact the process. Delay of the budget appropriation process is a major one and inability of the client to make up her mind is another.

The consultant quantity surveyor therefore appears to be asked to jump to solution within an extremely tight timeframe without any breathing space. It therefore appears that Toyota Kata, as a continuous improvement methodology, may not have the necessary features or characteristics to enable it to be applied to resolving the problem of compressed timelines during the pre-contract documentation in the Nigerian construction industry. While Toyota Kata appears to be highly skewed towards positivistic approach, the nature of the problem in context demonstrates the characteristics of social constructivism. This difference makes it difficult for Toyota Kata to be successfully applied to resolve the problem of compressed timeline during the pre-contract practice in the Nigerian construction industry.

2.6 Building Information Modelling

2.6.1 Introduction

The need to provide value for money through delivery of construction projects on time, within budget and to the required quality has put a lot of pressure on the operational framework of the construction process (Arayici, *et al.,* 2011). This has also necessitated the search for ways of making the construction process more efficient and effective (Latham, 1994; Egan, 1998; Wolstenholme, 2009; HM Government, 2013; Farmer, 2016). Building Information Modelling (BIM) is one of the suggestions put forward that could be used to

collaborate in delivering these stakeholders' requirements (Arayici, *et al.,* 2011; Pittard and Sell, 2016; Ahuja *et al.,* 2017). The UK BIM Task Group (RICS, 2017, p. 9) defines BIM as the "value creating collaboration through the entire life-cycle of an asset, underpinned by the creation, collation and exchange of shared three-dimensional (3D) models and intelligent structured data attached to them". Gu and London (2010, p. 988) also define BIM as "applying and maintaining an integral digital representation of all building information for different phases of the project life-cycle in the form of a data repository". Therefore, information is the primary asset of BIM (Pittard and Sell, 2016).

Although the embrace of BIM in the construction industry in developed countries, like the UK, is very significant (RICS, 2017) and largely triggered by government efforts, BIM has very little traction in the less developed countries like Nigeria (Onungwa and Uduma-Olugu, 2017), as there is no support or initiative compared to the UK government's support for BIM. Perhaps, if BIM is widely embraced and applied in Nigeria, it could be pivotal to resolving the key problems of the Nigerian construction industry (Onungwa and Uduma-Olugu, 2017), notable of which is compressed timelines during the pre-contract documentation in the Nigerian construction industry. Unfortunately, Onungwa and Uduma-Olugu (2017) aver that talks on BIM in Nigeria are purely theoretical as there are very few, if any, cases of designers and contractors who have working knowledge of BIM. The beneficial experience of collaboration in the use of BIM could only come about when other members of the design and construction team are using BIM in their respective activities, a situation which is not presently applicable in Nigeria (Onungwa and Uduma-Olugu, 2017).

2.6.2 Basic Methodology

The basic methodology for the implementation of BIM has been conceptualised into maturity levels (also known as the Bew-Richards BIM maturity model) (Richards, 2010) and as provided by the BIM Industry Working Group on behalf of the UK Department of Business Innovation and Skills (RICS, 2017). The maturity levels comprise of Level 0 to Level 3. Level 0 presumes no collaboration as only 2D drawings are produced and the design process still follows the RIBA Plan of Work. Output of documents at this level is a mixture of hard and electronic copies. At Level 1, the industry has progressed to some ideas of 3D drawing models with minimal collaboration. This level practices widespread

electronic sharing of data but lacks the use of a common platform hence, interoperability is a serious problem in the sharing of data among the design and construction team.

At level 2, the industry is to have a great deal of collaboration hence, technology and software platform should be able to communicate and share data and information even though they still lack a measure of interoperability. At this level, a repository may be built that warehouses all the design, cost, planning and management information and making it available to all team members even though they use different models. And of course the RIBA Plan of Work begins to give way to the Digital Plan of Work (DPoW). The UK government mandated that Level 2 must be complied with by 2016 on all UK government public-sector projects and this has been an enabler that has significantly increased the pace of BIM adoption in the UK.

Level 3 is the final level of BIM maturity model in which the aim of collaboration, integration and interoperability has been achieved (4D, 5D and 6D). Only one model, which warehouses all information, is kept in the repository. This enables any team member to access, amend, update and use the dataset in real-time. One of the teething problems militating against the achievement of Level 3 is the issue of copyright on documents since, at this stage, all documents would now be freely made available to all members of the design and construction process.

2.6.3 Discussion and Conclusion

BIM provides avenue for collaboration on projects and this has the capacity of reducing time and wastes during the procurement process (Pittard and Sell, 2016). All data and information are made available in real-time. Literature has identified the key issues that necessitate compressed timeline during the pre-contract documentation in the Nigerian construction industry as delay in client brief and delay in the budgetary appropriation process. With BIM, enormous time could be saved through the collaboration/integration of the design process, use of technology to measure/prepare contract documents and, interfacing/obtaining tenders from contractors though *e-tendering*.

It is probable therefore that BIM has the capacity to resolve the problem of compressed timelines during the pre-contract documentation in the Nigerian construction industry. However, a key feature of BIM is that it could only operate and be useful if all members of the design team buy into it. And as Onungwa and Uduma-Olugu (2017) claim, this is far

from the situation in Nigeria as it is difficult to find a project where all the participants have keyed into BIM. *Lone wolf* BIM adoption therefore brings no benefits to the team or the procurement process as a whole. And it would be difficult or near impossibility to obtain cases for study. For this reason, even though BIM has the capacity for resolving the problem under investigation, it is more likely to be incapable of resolving it in Nigeria until there is a wide adoption of BIM by all stakeholders.

2.7 Innovation

The analysis of the definitional debates on innovation (Sexton and Barrett, 2003a) brings out the key ingredients of innovation as, *novelty*, *implementation*, *value addition* and *process/product improvement*. From this analysis, Sexton and Barrett (2003b, p. 628) therefore propose a definition of innovation as, "the effective generation and implementation of a new idea, which enhances overall organisational performance". The aforementioned key ingredients of innovation appear to also sit at the core of the resolution of the problem of compressed timelines during pre-contract documentation as they seem to provide resolutions that are comfortable both with qualitative and quantitative paradigms. A solution to compressed timeline is more likely to be *novel* and be *implemented* in a process with the intent of *value addition* or *process improvement*. The striking semblance of innovation and the nature of the solution being sought to compressed timelines may perhaps indicate that innovation could be a panacea for compressed timelines during the pre-contract documentation in the Nigerian construction industry. For this reason, innovation literature is considered in more detail in Chapter 3.

2.8 Summary

This chapter discussed time and timing through the concepts of *Chronos* and *Kairos*. Although *Chronos*, the quantitative time, is often used in the construction industry due to the industry's need for efficiency, its limitation stems from its inability to accommodate unforeseen changes during the design and construction process. However, *Kairos* the qualitative time, which could ensure effectiveness of the design and construction process, has the capacity to deal with unforeseen changes in the design and construction process. The discussions in this chapter therefore classify the problem of compressed time demand during the pre-contract period of the procurement process as a problem that could be addressed through the structure of *Kairos*. The chapter partly concludes that there is the

need for a compromise whereby the benefits of *Chronos* (efficiency) and that of *Kairos* (effectiveness) could be achieved through a negotiated balance on the *Chronos-Kairos* continuum but highly skewed towards *Kairos*.

The research problem originates from practice due to the persistent requests of clients for compressed timelines during the pre-contract period of the procurement process. Jarvis (1999) discusses the need for practitioners to be engaged in key research initiatives particularly the ones that have greater relevance to practice. In addressing the methodology of such practice research, Moon (1999) argues for the use of reflection when confronted with practice problems, particularly the ill structured/messy ones, in a mental process of structuring information for an informed understanding. Moon (1999) relies on Rittel and Webber (1972) on structuring messy problems and Dewey (1933) on how people think. Reflecting on previous, often overlooked, but similar experiences on other projects where consultants were put under intense pressure to perform under very short pre-contract procurement timelines, brought to focus the impact of the research problem. The reflection process is focused on conducting a genuine enquiry by juxtaposing the current situation with historical and similar experiences (Realin, 2008) by the critical reflective practitioner.

Five process improvement techniques (TQM, *Six Sigma*, *Toyota Kata*, BIM and Innovation) have been shortlisted in this chapter towards addressing the research problem. TQM helps to eliminate wastes in a process. Its nature is that of a system approach to management which follows a sequential set of activities to achieve continuous improvement in very planned situations (Dale, 2014). However, the nature of the ill-structured problem in context is that the client is unable to plan and control the pre-contract timelines thereby requiring taking decision under conditions of uncertainty. Hence, TQM is eliminated as a process improvement technique in this context for lack of capacity in addressing issues under conditions uncertainty.

Six Sigma has the potential of being used to eliminate wastes, mistakes and rework in both materials and processes (Stewart and Spencer, 2006). However, compressed timelines of pre-contract documentation usually require revolutionary changes that go beyond continuous improvements. In the opinion of Maleyeff and Kaminsky (2002), *Six Sigma* is more of an evolutionary rather than a revolutionary intervention. Hence, *Six Sigma* is eliminated as a process improvement technique for lack of revolutionary capacity. *Toyota Kata* methodologies share the same characteristics, more or less, with TQM. These

characteristics are continuous improvement and highly planned activities towards the elimination of wastes and defects in a process. It therefore lacks the capacity to cope with decision making under uncertainty or unforeseen/unplanned activities, which the research problem requires. Toyota Kata is consequently eliminated as a process improvement technique in this context.

BIM provides the technological base for integrated project delivery and enables all parties on the project to be coordinated through a single repository where information are made available in real-time for an efficient and effective project delivery. BIM also has the ability to accommodate unplanned changes within its framework due to the leverage provided by the awesome capability of its interoperability platform. However, BIM environment in Nigeria is immature and not widespread as there are only cases of *lone wolf* adoption where a single party out of the total project stakeholders adopts BIM (Onungwa and Uduma-Olugu, 2017). In a scenario like this, the inherent benefits of BIM like real-time availability of information to all stakeholders, interoperability and integration, are lost. Although BIM has the capacity to deal with problems of compressed time demand, it is however eliminated as a process improvement technique because of poor adoption by relevant stakeholders in Nigeria.

Innovation is any new idea in an organisation, which when applied enhances overall organisational performance. Because of the good ability of innovation in accommodating unplanned changes within its frameworks due to being evolutionary and revolutionary, it appears to provide probable structure for dealing with compressed timelines during pre-contract documentation process. For instance, Garcia-Morales *et al*. (2008) and Kissi (2012) see innovation as the strategy that may provide appropriate solution in a rapidly changing environment. In view of the foregoing, innovation is hereby adopted as the approach to take the research project forward and its modus operandi are consequently investigated in more details in the literature and respondent opinions in subsequent chapters.

CHAPTER THREE

3.0 INNOVATION

3.1 Introduction

This chapter considers the relevant literature on innovation with the intention of identifying the necessary gaps in knowledge, which this study addresses. It discusses innovation through its origin and generic definitions and concludes that innovation must be seen and defined through its key ingredients of novelty, implementation, value addition and process/product improvement. It considers innovation in construction and professional service firms using relevant models and draws conclusion on what is unknown in the way a quantity surveying (QS) firm innovates in Nigeria particularly during compressed pre-contract timelines.

3.2 What is Innovation?

3.2.1 Origin of Innovation

The origin of innovation literature could be traced to the works of Joseph Schumpeter as far back as 1911 (Schumpeter, 1934/1983). It is a general knowledge that shrewd business owners were eternally looking for ways of deploying capital to areas of activities where the capital could be used most effectively and efficiently in order to maximize returns. At this early stages, Joseph Schumpeter contextualises innovation within the concept of economic gain thereby introducing the theory of development by arguing that economic gains could be achieved by a shift in paradigm and a challenge to the status quo of production techniques.

Baregheh *et al.* (2009), even though they focus on activities that are explicitly labelled as innovation, equally recognise the fact that issues of organisational change are implicit innovation which have been around for a long time. These viewpoints inform the general implicit understanding of innovation for so many decades until researchers began to recognise the impacts of markets and other forces on innovative products and processes and until the word *innovation* was explicitly used in the description of these acts and products from 1950 upwards (Baregheh *et al.,* 2009).

From hindsight, the Schumpeterian viewpoints could be described as "supply push" or "resource push" innovation (Barrett *et al*., 2008), which does not provide for adequate consideration for the feedback loop from the market, to wit, "market pull" (Zawdie, 2012). However, this appears to have provided a foundation for the thesis of Lewin (1958) in defining the three linear processes of change management: unfreeze, develop new system and refreeze. This is also similar to the original model of the three phases of innovation process: invention, innovation and, diffusion. Van de Ven *et al*. (2008, p.3) refers to this static process as, "invention – development – testing – commercialisation".

Of course, the idea of the entrepreneurial central role in innovation is clear but, over the years, the capacities of market in informing and shaping production capabilities and processes are becoming of increasing significance (Maister, 2003). A proper understanding of how this plethora of forces combine to initiate and shape any innovative idea therefore becomes critical.

Clearly against the Schumpeterian idea of certainty and linearity, writers like Kanter (1988) and Dooley (1997) began to consider the random and more appropriately non-linear characteristics of innovation. Van de Ven *et al*. (2008, p. 5) provides explanations into the five patterns of innovative processes of: "fixed, periodic, chaotic, coloured noise and random chance". In looking at innovation as a systemic phenomenon with identifiable feedback loop, Zawdie (2012) classifies Schumpeterian view as a linear approach and argues for the consideration of the complexity of processes and inputs in innovation engagements.

Van de Ven *et al*. (2008) sees every living system as existing in a state of disequilibrium, which enables it to take different forms and postures in an uncharted space that could be best understood as dynamic systems. In the words of William Coyne in the forward to Van de Ven *et al*. (2008, p. viii), "the river may be uncharted, but much of the process of launching and maintaining an expedition can be known". Today therefore, the concept of innovation has developed into a consideration of innovation not only within the context of both the resource push and/or market pull but, also within the tangibility of products and the intangibility of processes.

3.2.2 Definition of Innovation

Barrett *et al*. (2008) opine that "innovation" is an overused word as it is very common for people to employ it in defining a plethora of activities and actions like invention, modernisation, alteration and novelty. The confusion that could arise from this necessitates the need for an agreeable definition that could convey the meaning that is acceptable for the generality of people and, in particular, researchers. In support of this viewpoint, McAdam *et al.* (2004) consider the plethora of definitions of innovation and opine that the absence of a generally agreed definition is problematic.

Etymologically, innovation originated from the Latin word *innovat*, which means *renewed* or *altered* (Oxford Dictionary of English, 2005-2017). However, with the epistemological stance of words deriving meaning in context, innovation may therefore be defined within the context of its meaning to a researcher in a particular discipline. Therefore, different disciplinary viewpoint will provide different definition according to Baregheh *et al*. (2009).

Sexton and Barrett (2003a) analyse the definitional debates of innovation and conclude that there is consistency between the general literature and the construction literature on the definition of innovation even though innovation literature mostly concentrates on large firms at the expense of small firms. Both literatures agree that innovation is concerned with the generation of a new idea that is implemented by the firm (see Thompson, 1965; Amabile *et al*., 1996; Slaughter, 1998; Woodcock *et al*., 2000). These definitions however do not consider the value inherent in the innovation process and perhaps assume that innovation is always positive (Kimberly, 1981) because it must add value in one way or the other to qualify as innovation (Barrett *et al*., 2008). However, this idea could be put into proper perspective by considering Van de Ven *et al*. (2008, p.11) who opine that "ideas that are not perceived as useful are not normally called innovation; they are called mistakes".

Perhaps this is why Capaldo *et al*. (1997) view innovation as synonymous with uncertainty and risk because uncertainty and risk underlie the transformations into either benefits or mistakes. Freeman (1989) offers a widely quoted definition, which brings into focus the essence of impact and value inherent by seeing innovation as a "non-trivial change" that

should add value in the form of an improvement to the process, product or system. From the viewpoint of Freeman (1989) therefore, cosmetic innovation may not be seen as innovation as its ability to add value may be in doubt.

The key ingredients of innovation from the above views appear to be novelty, implementation, value addition and process/product improvement. Sexton and Barrett (2003b, p. 628) therefore summarised these key issues and proffer a definition for innovation as, "the effective generation and implementation of a new idea, which enhances overall organisational performance". This succinct definition is adopted for this investigation. However, Baregheh *et al*. (2009) submit that for a multidisciplinary definition of innovation, there is need to consider the six innovation attributes of *nature of innovation, types of innovation, stages of innovation, social context and, aim of innovation.* Hence, in their opinion, innovation should be defined as:

> the multi-stage process whereby organisations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in the marketplace.

3.3 Technological Innovation

Technology is a term that is formed from the Greek words *technologia*, meaning ***systematic treatment***, and *techne*, meaning ***art*** or ***craft*** (Oxford Dictionary of English, 2005-2017). It could therefore be inferred that technology means a systematic art. Leiringer (2003) has pointed to the difficulty of separating technological innovation from non-technological innovation and concludes that it is a fuzzy arrangement in some contexts. However, in other contexts, particularly in the digital economy, there is the need to classify products and processes that have benefited deeply from technological innovation. While authors like Freeman (1989) see technological innovation as an external shock to which an organisation must respond in order to survive and have christened it the "technological imperative", Van de Ven *et al* (2008, p. 151) expanded it from the narrow tangible physical artefact or device to include the intangible "proprietary design knowledge embodied in artefact or device" which can be protected as property right under the law. Technological innovations are generally divided into technological products innovation and technological process innovation (Leiringer, 2003). According to OECD (1996, p. 31), technological product and process (TPP) innovations are:

> technologically new products and processes and significant technological improvements in products and processes. A TPP innovation has been implemented if it has been introduced on the market (product innovation) or used within a production process (process innovation).

Technological product innovation could be seen from the perception of either a technologically new product or a technologically improved product even though most organisation are quick to classify their product innovations as new (Leiringer, 2003). The OECD (1996, p. 32) defines a technologically new product as:

> a product whose technological characteristics or intended uses differ significantly from those of previously produced products. Such innovations can involve radically new technologies, can be based on combining existing technologies in new uses or can be derived from the use of new knowledge.

Equally also, OECD (1996, p. 32) defines technologically improved product as:

> an existing product whose performance has been significantly enhanced or upgraded. A simple product may be improved (in terms of better performance or lower cost) through the use of higher-performance components or materials, or a complex product, which consists of a number of integrated technical sub-systems, may be improved by partial changes to one of the sub-systems.

Finally, a technological process innovation is a dynamic system, which is defined by OECD (1996, p. 31) as:

> the adoption of technologically new or significantly improved production methods, including methods of product delivery. These methods may involve changes in equipment, or production organisation, or a combination of these changes, and may be derived from the use of new knowledge.

3.4 Market-Based and Resource-Based Views of Innovation

Every organisation operates within the internal and external environments and these environments shape the operations and the survival of such organisations (Kast and Rosenzweig, 1985). Innovation too could be captured within the symbiotic operations between the organisation and its environments. The importance of the environments to the ability of organisations to innovate is properly captured by Tidd *et al.* (2001) in their submission that innovative organisation are those organisations that continually scan their environments for the necessary and critical information about innovation. While these information are used for competitive edge, Barrett *et al.* (2008) has demonstrated that firms that are very much aware about the import of their environments in shaping their competitive edge outperform other firms that lack this ability.

The market-based view of innovation stipulates that organisations exploit the market signals and parameters in the external environment in engaging in innovation to pursue competitive advantage and growth (Leiringer, 2003). The resource-based view of innovation on the other hand heavily leans on the capacity of the organisation in using its internal resources as the source of innovation for sustainable competitive edge and growth. Research has shown that neither the market-based view nor the resource-based view is adequate in providing the organisation, through innovation, with the competitive edge or sustainable growth required and Barrett *et al.* (2008, p. 17) has therefore suggested the linking of the capacities of both views of innovation to achieve an "optimal innovation balance" of the market-pull and resource-push parameters using the concept of *precipitating events* as shown in Figure 3.1. This concept sees an innovating firm as that which can recognise and act on the precipitating events in both the internal resources and market conditions in a "balanced and integrated fashion" (Barrett *et al*., 2008, p. 16).

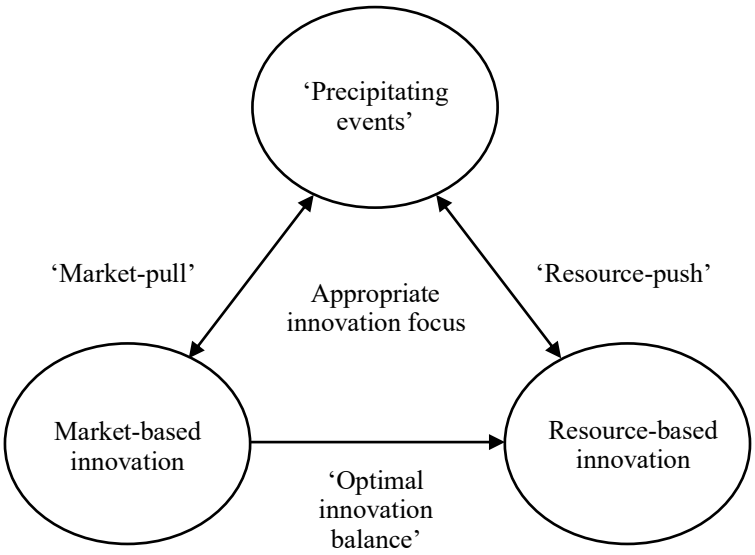


Figure 3.1: Synthesis of market-based and resource-based views of innovation (Barrett *et al.*, 2008)

Literature about how professional service firms in the construction industry are innovating through resource-based or market-based paradigms and in some cases through a combination of both paradigms as shown in Figure 3.1 (please see Barrett *et al*., 2008) is very rich in the UK and other developed countries. It is however very sparse, and in some cases non-existent, when it comes to firms in Nigeria particularly professional QS service firms as discussed in section 3.7.

3.5 Barriers to Innovation

The working document prepared by the Civil Engineering Research Fund (CERF, 2000) refers to the uniqueness of the construction industry, amongst other industries, as an industry that has poor reception to innovations due to the many barriers placed on the way of innovation in the industry. It claims that the few firms engaging in innovation in the industry are doing so not from the genuine desire to innovate but just as a panic not to be left behind. Barrett *et al.* (2008) consequently identify those barriers to innovation in the construction industry as the fragmentation of the industry, market cycles, antagonistic procurement policies, organisation and management of construction and the propensity to use relatively low technology.

Leiringer (2003) recognises the fact that barriers happen throughout all the stages of the innovation process but he bundles those barriers into external, organisational and economic classifications. Issues like lack of infrastructure, lack of technological opportunities, customers not receptive to new products and processes, legislations, norms and regulations are classified as external factors that impede innovation. Organisational factors include lack of skilled personnel, lack of information on applicable technology, resistance to change within the organisation and insufficient innovation potential. Finally, economic factors that impede innovation comprise of high cost of innovation, high risk of innovation, lack of appropriate sources of finance and a very long pay-off period for innovation. Although some efforts have been made in the industry over the decades towards addressing these barriers and improving innovation (Slaughter, 1998; Barrett *et al.,* 2007; Wolstenholme, 2009), evidences like Farmer (2016) on human resource problems and Pinney *et al.* (2017) on commercial difficulties show that many barriers are still very much around and require a lot more efforts if the industry is to catch up in innovation with other industries.

3.6 Key Models of Innovation

3.6.1 Magnitude and Linkage Innovation Models

Slaughter (1998) presents five models of innovation in construction as shown in Figure 3.2, which could be seen as the summary of most of construction innovation models before

1998. They are: incremental, modular, architectural, system and radical. These models offer strategy for introducing innovation in construction projects by considering the key parameters of "magnitude of change" and "the linkages to other components and system" (Slaughter, 1998, p. 229).

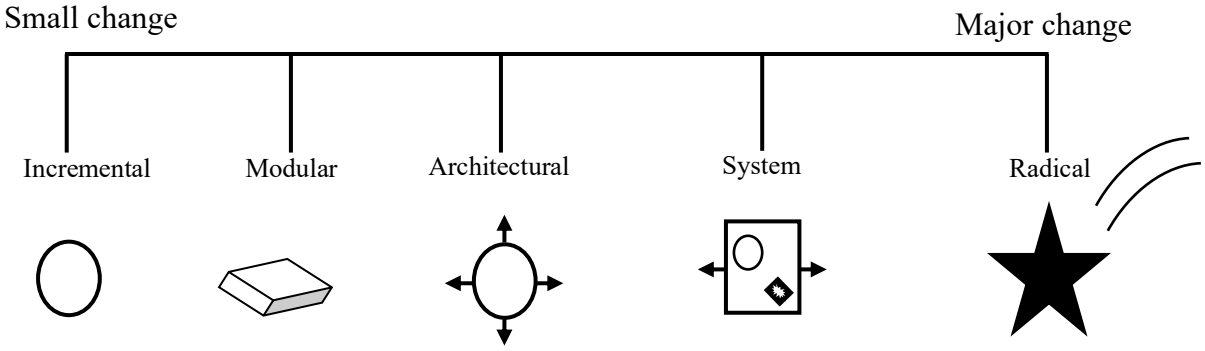


Figure 3.2: Magnitude and Linkage Innovation Models (after Slaughter, 1998)

Incremental innovation is about small change using the existing organisational infrastructure (Slaughter, 1998). Salge and Vera (2011, p. 157) refer to it as incremental learning which, "gradually refines and expands organisations knowledge base" and "steadily improves upon existing knowledge". It relates to innovation within the organisation where the concern is on improvement to an existing product or the development of a new and perhaps cheaper product that has the capability to perform the same set of functions (Leiringer, 2003). Since incremental innovation does not interact with other systems, its effect is restricted to the organisation hence its impact is predictable.

For instance, the use of word processing or spreadsheet applications in a QS firm could be seen as an incremental innovation over the previous use of typewriter. It is an improvement in the way documents are produced by improving the efficiency of the process but using the existing system or infrastructure. Therefore, irrespective of whether a typewriter was used or the word processing and spreadsheet applications were used, quantities have to be calculated from drawings as a prelude to either approach. Also, the migration from spreadsheet to specialist application software in the preparation of bills of quantities could also be seen as an incremental innovation for the same reason.

Radical innovation on the other hand is concerned with sudden or major change, which discards existing infrastructure and installs a new infrastructure for the attainment of a goal (Slaughter, 1998). Due to its nature, radical innovation usually has its source from areas external to the organisation. Since innovation is akin to a foray into uncharted territory (Van de Ven *et al*., 2000), the impact of radical innovation may be severe as it normally brings a new order of doing things. For instance, when pragmatic ideas are brought from manufacturing and aerospace into construction (Gann, 1996; Winch, 2010) it may result into radical innovation as the whole framework of operations may be replaced with new and, in most cases, alien to the original system. According to Slaughter (1998) the introduction of steel into construction was a radical innovation. More recently also, the introduction of Industrialised Systems Building (ISB) or Off-site Manufacture (OSM) has all the features of a radical innovation as it changes the traditional process of construction moving the production from the site to the factory while only the assembly is carried out on the site. This is the essence of the whole idea of smart construction as argued by Farmer (2016) and further espoused by Pinney *et al.* (2017) and House of Lords (2018).

In practice, the migration of a QS firm to a Building Information Modelling (BIM) platform could be seen as a radical innovation. Olatunji *et al.* (2010) opine that adoption of BIM has the potential of revolutionising the art and science of work measurement and work estimating in a way that the traditional way of doing these would be cast to the dustbin of time and never to be remembered. BIM is believed to have the capacity to change the type of information that is produced and the way it is processed in the construction industry. It brings about an integrated team that overlaps in function to achieve process and product improvement by engaging in iterative processes, which is captured and processed in real-time providing an integrated database of information covering all aspects of project delivery from inception to disposal. On BIM platform, quantities may be generated automatically through the design process. Taking-off, abstracting and billing processes are therefore fully automated thereby removing the time required for those activities. This gives the quantity surveyor more time to concentrate on the cost management responsibilities, the skills that require less automation (The Economist, 2014).

Modular innovation is concerned with improvement or "a significant change in concept within a component" or unit of a system and where all other units or modules linking it remain the same (Slaughter, 1998). In carrying out modular innovation therefore, there is

little or no need to negotiate with the external links because most of the innovation is internal and it does not affect the external system. Slaughter (1998) gives the example of the automation of the machine that ties a binding wire as a modular innovation because while its operation affects the efficiency and effectiveness in tying the binding wires, it does not have much effect on other components of reinforced in-situ concrete production.

Architectural innovation on the other hand is an innovation that deals with a small change within a component but a significant change in the links to other components (Slaughter, 1998). The implication for architectural innovation is that due to the links with other components of the system, there is need to negotiate with the external links for any successful innovation. Hence, other project stakeholders need to be involved in the negotiation for the innovation. A self-compacting concrete that eliminates the compaction stage by controlling the sizes and homogeneity of the materials is an example of an architectural innovation (Slaughter, 1998). Also the adoption of Building Information Modelling (BIM) platform by a QS firm would only be possible with a successful negotiation with other external links like the architect, engineers, clients and other supply chain stakeholders. The QS firm could not do it alone without the full cooperation of the other members of the design team and supply chain network.

System innovation involves the integration of multiple independent innovations into an integrated system, which has the capacity to perform new functions (Slaughter, 1998). Due to the nature of the construction industry in which a number of independent units or stakeholders are brought together to deliver an integrated bundle of benefits, construction industry is very familiar with system innovation. A typical example of a system innovation is the Industrialised System Building (ISB) or Off-site Manufacture (OSM). All the different components or stakeholders like the architect, engineers, contractor, quantity surveyor and client have to work together and be integrated into a system to deliver the building. It does not only meet the requirements of individual components but brings about new advantages to the project quality control and efficiency.

3.6.2 Generic Innovation Model

Barrett *et al*. (2008) present the generic innovation model, which organises innovation in construction along five themes of Innovation Focus, Organisational Capabilities, Innovation Process, Contextual Factors and Innovation Outcomes as shown in Figure 3.3

Although the model is offered as a way of structuring the discussions on innovation, it also provides a systemic outlook on innovation as it affects every innovative initiative. Different organisations engage in innovations for different reasons therefore, the focus of innovation involves understanding what innovation means in the first place. Various definitions have been offered that distinguish innovation from invention and other organisational change initiatives. However, appropriate focus according to Barrett *et al*. (2008) enables a consistent consideration of the key motivations within the intentions and meaning of innovation.

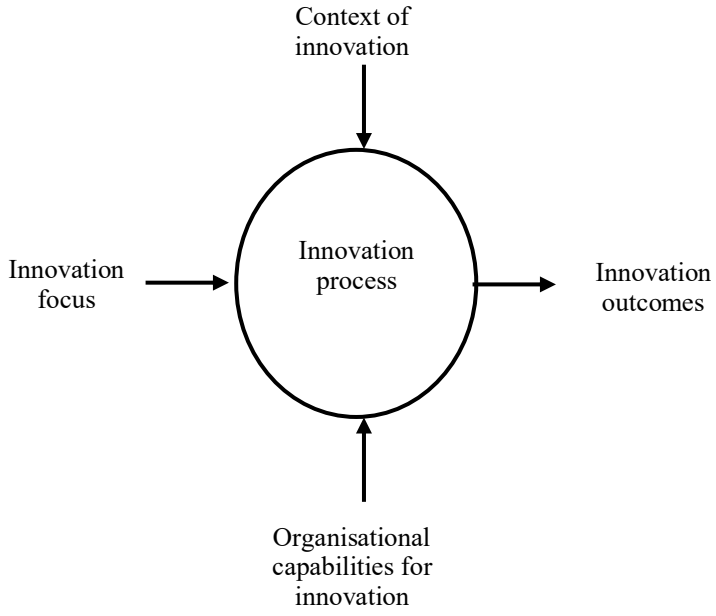


Figure 3.3: Generic Innovation Model (Barrett *et al*., 2008)

Context of innovation relate to those drivers that encourage or motivate organisations to innovate. Contemporary views consider competition as becoming very fierce due to the changing needs of clients and the need to deliver services more efficiently and effectively. However, it is also a truism that organisational resources play dominant roles, at least, in the capacity of firms to innovate when considered in tandem with knowledge capital (Egbu, 2012a). Barrett *et al*. (2008) subsequently argue for an appropriate balancing of the resource viewpoint and market viewpoint of innovation while also considering the project-based nature of the construction industry and the different needs of small firms.

According to Burgelman *et al*. (1996), organisational capabilities are key factors that engender innovation in an organisation. Barrett *et al*. (2008) propose a combination of

internal and external sets comprising business strategy, market positioning, technology, people, organisation of work, interaction environment and given environments as the necessary sets of characteristics required in small firms in the construction industry. For an effective innovation outcome, the argument of Barrett *et al*. (2008) is that these characteristics must be viewed in a systemic manner and managed as interdependent and integrated variables.

Process is defined as the "series of actions or steps taken in order to achieve a particular end" (Oxford Dictionary of English, 2005-2017). Two viewpoints in consideration in innovation literature are the rational and behavioural school of thoughts (Barrett *et al.*, 2008). The rational school of thought mirrors the linear idea of process that moves from the first to the last step without any feedback loop but with an extensive dependence on trial-and-error in order to get the right process (Van de Ven *et al.,* 2008; Barrett *et al.*, 2008). Van de Ven *et al.* (2008, p. 4) refers to this as the "stability" model. The behavioural school of thought considers innovation process as a "nonlinear and dynamic system" (Van de Ven *et al.,* 2008, p. 5) which is an interplay of iterative actions that is situation-dependent and not based on fixed cast-in-stone steps (Van de Ven *et al.,* 2008).

Again, Barrett *et al*. (2008) argue for a process, which, although was planned with definitive steps, remain open to the vagaries of change and extraneous factors or variables that may crop in during the process. This point is further discussed in sub-section 3.6.3. In conclusion, Sexton and Barrett (2003a) opine that, successful innovation outcomes are achieved through an appropriate "innovation focus" that is responsive to "contextual factors" and realized through appropriate "organizational capabilities".

3.6.3 Knowledge-Based Innovation Model

Sexton and Lu (2012) present a separate model for knowledge-based innovation, which includes appropriate exploitative and explorative knowledge capital, developed around five variables of relationship capital (RC), structure capital (SC), human capital (HC), knowledge capital (KC), and interaction environment (IE) (also see Lu and Sexton, 2006). This model is specifically useful in understanding innovation in professional service firms, which by being classified as knowledge-intensive organisations are synonymous with knowledge-based views of innovation (Lu and Sexton, 2006). An examination of the model reveals that it could also be incorporated within the generic model discussed earlier

(Barrett *et al*., 2008) but with further discussions on contextual factors and organizational capabilities of knowledge management to reflect the dynamics of HC, RC, SC and KC. Figure 3.4 shows the interrelationship of HC, SC, RC, IE and KC.

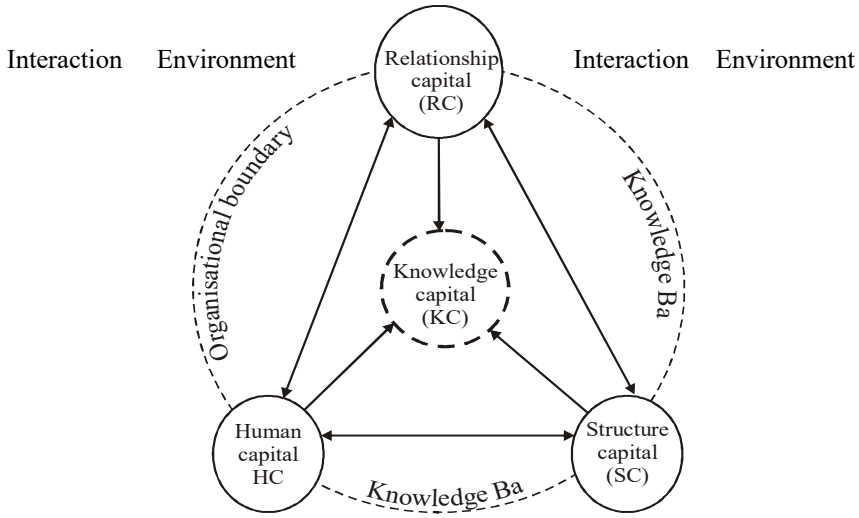


Figure 3.4: Knowledge-Based Innovation Model (Sexton and Lu, 2012)

Human capital is the individual capability and motivation of the knowledge worker in the organization. Structure capital is the knowledge embedded in various organizational facilities, system and processes like knowledge management infrastructure. Relationship capital is the knowledge derived from networks outside the organization. Interacting Environment is the operating environment that the organization can influence. The platform where interactions take place between the human capital, structure capital and relationship capital is the knowledge ba. This platform could be physical, virtual or mental platform.

Knowledge capital represents the dynamic combination of both the context and process of innovation and the flow of knowledge from individual-organization-individual. KC is actually the organizational group memory and represents the aggregate sum of the combination of HC, SC and RC. The arguments of Sexton and Lu (2012) through this model are that any successful firm in innovation must first be successful in building knowledge capital and also that the ingredients of building knowledge capital are the appropriate relationship capital, structure capital and human capital.

3.7 Innovation in Construction

Due to the nature of the construction industry, innovation in construction has been described as very slow (Slaughter, 1998). This slow pace of innovation has been the *raison d'etre* of different past governmental initiatives in the UK. (see Latham, 1994; Egan, 1998). An appraisal by Wolstenholme (2009) seems to indicate that not much has been achieved through these initiatives in how innovation could be beneficial in the construction industry with particular reference to effectiveness and efficiency in the sourcing and deployment of resource inputs.

Even though Barrett (2012) recommends that "doing things right (efficiency)" and "doing the right thing (effectiveness)" has enormous potential of bringing a lot of benefits to the industry, Aouad *et al*., (2010) opine that the journey seems to be far and therefore requires purposeful research at different levels and points of innovation in corporate operation. Barrett *et al* (2008) opine that innovation in construction is seen in different perspectives depending on the profession or activity leaning of the individual. Indeed, while the Architect sees innovation through the lens of design and the appearance of the finished built asset, the contractor sees innovation essentially in the type and quality of materials and the techniques employed in delivering the built asset (Barrett *et al.*, 2008).

The construction industry does innovate (Slaughter, 1998) contrary to the traditionally held views about the lethargy to innovation in the industry. However, its practice is still in early stage when compared with other industries for instance, manufacturing (Barrett *et al.*, 2008; Wolstenholme, 2009). Several reasons could be adduced to this *little drop of water in the ocean* approach to innovation in the construction industry but the primary ones are, the project-based nature of the industry (Gann and Salter, 2000; Egbu, 2012a), the fragmentation of the industry (DETR, 2000) and, the adversarial tendencies of the industry (Latham, 1994; Egan, 1998; Wolstenholme, 2009; Farmer, 2016; House of Lords, 2018).

Project-based organisations are characterised by temporary and short-term relationships, which do not encourage any innovative initiative to be properly "learned, codified and applied to future projects" (Winch, 1998, p. 273). With the bulk of the industry consisting of a high number of small firms with each employing mostly less than eight people (DETR, 2000), large scale innovation may be impossible due to the inability of the small

firms to leverage on size, resources and long term relationships. Adversarial environment, which is a feature of construction undertaking, may not provide an appropriate atmosphere for innovation, as people are busy protecting individual turf through highly skewed argumentation (Latham, 1994; Egan, 1998).

Gann and Salter (2000), Sexton and Barrett (2008), Lu and Sexton (2006) and Sexton and Lu (2012) all agree that within the construction industry, innovation literature, research and practice are heavily skewed against the knowledge-intensive professional organisations. Egbu, (2012a) stresses this further by opining that since innovation is anchored on the workforce who provides the knowledge capital for each organisation, the ability of an organisation to innovate is heavily dependent on how it is able to exploit its knowledge capital. This provides an interesting dimension to the resource push innovation, which has hitherto been seen only from the material resource point of view as in Schumpeterian theories of economic development. The inability of the construction industry to adequately harness its knowledge capital could therefore be seen as a serious setback to innovation in the industry.

HM Government (2013) in its industrial strategy, *Construction 2025,* provides a new initiative of the UK government towards working in partnership with the industry. It focuses on achieving UK global leadership in four critical areas of *people*, *smartness*, *sustainability*, *growth* and *leadership.* While this is on-going, Farmer (2016) provides a damning report on the status of the human resource of the UK construction industry and argues that if urgent actions are not taken to innovate extensively in the industry, the UK construction labour force which is facing challenges of an aging population, low level of technology and probable negative migration through the effects of BREXIT, may collapse. Among the recommendations of Farmer (2016) is the urgent need to embrace offsite manufacture of buildings (Pinney *et al.,* 2017; Goulding *et al.,* 2017; House of Lords, 2018).

Evidence of the capability of firms in Nigeria to innovate (Egbetokun *et al*., 2010) or of factors that influence innovation and competitiveness of firms (Jegede *et al*., 2012) are mostly about manufacturing and oil and gas service firms respectively. Of course these studies could provide some ideas about Nigerian firms and how they innovate, such ideas could only be generic, at best, to the extent that they relate to the same macroeconomic

indices. When the focus is however on a specific area like professional service firms in the construction industry, literature available is sparse.

In their work on organisational culture and innovation practices, Abiola-Falemu *et al.* (2010) place attention on construction contracting companies as against professional service companies like QS firms. Although the study submits that innovation practices are encouraged in the construction contracting companies in Nigeria, the study however did not cover professional service firms. Also, previous related studies like Oyediran and Odusami (2005) and Oladapo (2006) only discuss computer usage by Nigerian quantity surveyors and the effect of ICT on professional consulting firms respectively and not necessarily within the context of innovation. Both Moohamed *et al.* (2014) and Onyeagam *et al.* (2019) who discuss innovation in professional service firms, only sought to classify firms along Rogers's (1995) *Innovation Diffusion Theory* (innovators, early adopters, early majority, late majority and laggards) without detailing how these firms actually innovate.

In their recent work in human resource management practices in QS firms, Oke *et al.* (2016) submit that the welfare and mentoring of staff of QS firms in Nigeria are poor and consequently affect the ability of Nigerian QS firms to innovate so as to be competitive in both local and international markets. As would be seen in the knowledge-based innovation model in section 3.6.3, the human resource capital, the relationship capital and the structural capital all combine to inform the knowledge capital of an organisation. Where one of these features is short or encumbered, the firm's knowledge capital and the ability to innovate are greatly curtailed.

Perhaps this may have imbued Kwanashie (2017) who laments the dearth of skills in the Nigerian construction industry generally. He argues that construction industry trades and skills in Nigeria are not attractive to young Nigerians due to the *brick and mortar* nature of the industry unlike manufacturing that has deployed a great deal of technology. He encourages policy makers and governments at all levels to recognise the need to innovate to make the industry attractive to the youth. Failure to do this may result into skill shortage and perpetual poor quality of job delivery of construction deliverables in Nigeria. The importance of repositioning the construction industry for economic growth in Nigeria was emphasised by Alufohai (2017) who challenges the industry to innovate into new ways of working and new products like mortgaging as ways of leveraging the industry for economic development.

3.8 Knowledge Gap

Slaughter (1998) opines that the construction industry does innovate even though its level of innovation could not be compared to that of the manufacturing industry due to the fragmentation and project-based nature of the construction industry. Series of recommendations (Latham, 1994; Egan, 1998; Barrett *et al.,* 2008; Farmer, 2016) show that innovation is necessary in making a step change in the construction industry and Garcia-Morales *et al*. (2008) and Kissi (2012) see innovation as the right strategy that may provide appropriate solution in a rapidly changing or unpredictable environment like during pre-contract documentation. To unearth the *how* and *why* of innovation, Aouad *et al*., (2010) calls for purposive research at different levels or points of innovation.

However, the main studies on construction innovation in Nigeria seem to concentrate on other issues but the process of innovation. For instance, Abiola-Falemu *et al.* (2010) place attention on organisational culture of construction companies during post-contract period while Oyediran and Odusami (2005) and Oladapo (2006) who discuss computer usage and the effects of ICT on professional consulting firms did not relate their discussions to the process of innovation. Also, Moohamed *et al.* (2014) and Onyeagam *et al.* (2019) who discuss innovation in QS professional service firms, only focus on classifying firms along Rogers's (1995) *Innovation Diffusion Theory* without investigating the innovation process.

Barrett *et al.* (2007) opine that innovation in professional service firms is hidden due to the inadequacy of the existing instruments and methodology of identifying and collating such innovations. Perhaps this may be linked with the general problem of externalising tacit knowledge (Polanyi, 1966; Kolb, 1984; Mann, 1998). In view of the foregoing, it does appear that the hidden process of these innovations may have accounted for reasons why previous studies may not have documented its process. This study therefore recognises this gap in knowledge and therefore focuses on bridging the gap by showing *how* professional QS service firms innovate in Nigeria particularly during the pre-contract period when there is ample pressure on the capacity and timeline for the delivery of contract documents.

3.9 Summary

This chapter identified innovation through the historical perspectives and culminates in the generic definition of innovation as, “the effective generation and implementation of a new idea, which enhances overall organisational performance” (Barrett *et al*., 2008). Adopting this definition, this chapter further defined technological innovation from the context of new products or new processes and improved products or improved processes. The chapter discussed innovation through the different models in construction and professional service firms and these provide critical appraisals of what is known about the types of innovation in professional service firms.

Two different viewpoints of innovation, market-based and resource-based, were also discussed. The conclusion in literature posited that since innovation in construction is affected by both viewpoints, there is need for a delicate balance between both viewpoints using the concept of *precipitating events* to harness the benefits of the two categories, particularly in professional service firms. It is also contended that although a lot have been done to address the barriers to innovation, recent evidence shows that much more are required to be done in addressing the barriers. Through evidence from literature, the chapter concludes by identifying the knowledge gap in the innovation process.

CHAPTER FOUR

4.0 PROFESSIONAL SERVICE FIRMS

4.1 Introduction

This chapter reviews the key components of a profession and compares this with the key goals of a professional practice firm drawing out similarities in these. Finally, the chapter looks at the size of quantity surveying (QS) firms in Nigeria and discuss the ability of these firms in meeting the previously identified professional goals.

4.2 The Components of a Profession

Elliott (1972) identifies the four key components of a profession as: recognised body of knowledge, barrier to entry, mutual recognition and meeting the need of the society. Barriers to entry and mutual recognition are usually within the purview of professional associations and they relate to the rite of passage overseen by the profession and the stamp of approval from co-professions respectively. The body of knowledge in the opinion of Scott (2001, p. 129) is taken as the "cognitive framework that define arenas within which they claim jurisdiction and seek to exercise control". This is essentially based on the corpus of subjects that have been aggregated to meet the requirements of the practice of the profession.

Of greater importance however is the ability of the profession to meet the socio-economic needs of the society in which it exists and this has been the key issue that could determine its sustainability. Hill *et al*. (2013) look at the ethical concerns as it relates to accountability and the responsibility of acting in the public interest and conclude that there is a chasm between what professions should be and what they are presently. This may require the various professional associations to be very proactive in defining the standards, particularly ethical standards, and helping the individual professional to live up to societal expectations.

Hughes and Hughes (2013) discuss the relevance of these key components within the context of the changing structure of professionalism in contemporary practice and argue that there appears to be an increasing skewness against *entry barriers* but towards *the*

importance and role of society in determining and defining professional practice. Perhaps this is why there is a changing profile in the corporate structure of key professional firms in accounting and financial services (Pickering, 2015) and built environment professions (Hughes and Hughes, 2013) in favour of publicly quoted corporate firms as against sole proprietorship and partnership which was previously favoured.

Furthermore, Hughes and Hughes (2013) x-ray the role of professionalism, particularly in the built environment, and conclude that it is fast changing and the façade of opaque operations which professions have enjoyed before now are gradually being removed, as clients are demanding more consultations and involvements in the professional decisions that affect them. This may be a signal that professional service firms need to innovate to be able to meet both client and societal demands. This shifting structure of professionalism from self and professional body regulation to societal governance as observed by Hughes and Hughes (2013) and Hill *et al.* (2013) resonates with the earlier views of Schon (1991) who argues that the inability of professionals to regulate themselves and deliver professional expertise create a loss of public trust and confidence in their operations.

The place of trust in any successful professional practice is very critical as espoused by Brewer and Strahorn (2012) through the lens of the project management profession. What is increasingly clear from all the arguments above is that there is the urgent need for every professional practice firm, particularly in the built environment, to rediscover itself through innovative practices in the delivery of services so as to earn the trust of not only their clients but also the larger society. The demand for compressed timeline in pre-contract practice is such an area where clients have critical demands from QS firms. Have QS firms been able to earn the trust of their clients and the society in general during pre-contract practice? It is doubtful. However, literature is very sparse on how this area is being addressed and this creates a gap in knowledge that requires further studies.

4.3 Meeting the Key Goals of Professional Service Firms

Maister (2003) identifies the key goals of professional firms as that of *service* to the client or the market place, *satisfaction* to the staff or the knowledge capital and *success* and profitability to the directors and partners. Innovation within the firm therefore should be aimed at achieving these three goals efficiently and effectively. Maister (2003) however recommends that a delicate balance needs to be maintained between these three goals

depending on the priorities that individual firm attaches to them. This delicate balance could however be achieved through the consideration of what Maister (2003) refers to as the three types of professional works: *Brains*, *Grey hairs* and *Procedural*. Another way of classifying this is to look at what the firms have: *expertise*, *experience* and *efficiency. Brains* would therefore go with *expertise*; *grey hairs* go with *experience* while *procedural* goes with *efficiency*.

The first category of firms carries out the *Brains/expertise* work and is saddled with "creativity, innovation, and the pioneering of new approaches, concepts or techniques; in effect, new solution to new problems…their appeal to the market is 'hire us because we are smart'" (Maister, 2003, p. 4). Clients that require *expertise* are those that have highly risky, dynamic and one-off problems. They look for firms that possess top of the league professionals who are good at resolving novel and difficult problems that in most cases are unstructured and without any existing algorithms for solution. The strategy of this type of professional service firm is to concentrate in employing mostly senior and experienced professionals and a few junior staff to leverage the professional skill of the senior staff. The types of jobs executed in these firms are very unique, complex and novel and are most likely to be attractive to technological innovation since the creative resources of tacit knowledge capital are always trying to find novel ways.

The second category of firms carries out the *Grey hair/experience* work and they are firms that have wide experience in the particular type of work and are using the experience as their selling point. They engage in this type of problems on regular basis and have the capacity to understand and deal with the work as effectively as possible. The *experienced* are the firms who have developed competencies in some areas of practice and have many models or templates for whatever commission they are about to be engaged in. Unlike the expert discussed above, they do not start on blank sheets rather, they appeal to clients to hire them because they have been through that particular scenario before (Maister, 2003). They therefore build on accumulated experiences or group memory and operate on teamwork basis. Because of the fairly repetitive nature of the work engaged in by the experience firm, there is a measured involvement in technological innovation.

The third category of firms carries out *Procedural/efficiency* works. While the client may be able to perform procedural work in-house with its own staff because it is not a difficult work, the professional firm could however perform the work with speed in record time

making it more efficient. Hence, efficiency is the selling point for this type of professional firm. Due to the ability to programme the tasks engaged upon in these firms, and their routinized nature, they need little or no innovation. The essence of efficiency is cost saving by being able to complete the deliverables within the shortest time possible. Efficiency firms are highly routinized. The strategy of such firms in staffing is high leverage because they employ more junior staff and less senior staff. The leadership characteristics of an efficiency based professional firm are that of organised and disciplined rather than inspirational (Maister, 2003).

Of course, there is no professional firm that is fitting perfectly into any of these categories, they mostly have a measure of each category but with heavy inclination towards a dominant category (Maister, 2003). In consideration of the structure and modus operandi as observed by Ogunsemi *et al.* (2013), the bulk of the QS firms in Nigeria appear to be the grey hair/experience practices where they bank on some experience from previous projects. Most of these firms are selected and commissioned by clients having passed through the procurement process that heavily relies on previous experience. Perhaps this seems to be the reason why innovation is not very pronounced in the activities of many QS firms in Nigeria. Though there are no strict classifications of QS firms along a continuum of levels of innovation, the impacts of product and process improvement in some professional firms however are encouraging. For instance, Oyediran and Odusami (2005) allude to the increasing adoption of information and communications technology by some professional QS firms in Nigeria.

The requirement for innovation in firms appears to be a long-standing issue and it enhances adaptable capabilities in firms (Brooks, 1967; Schon, 1991). However, the increasing client demand for more and better services from professional service firms generally (Latham, 1994; Egan, 1998; Wolstenholme, 2009) and professional QS firms specifically are pointers to the fact that the innovation phenomenon is still largely unresolved particularly in QS firms in Nigeria.

The key points of the views expressed above is that professional service firms need to innovate in order to meet its goals and be sustainable as an expert; which is a pedestal on which the firm could be taken as very knowledgeable and competent in the particular professional calling. Combining the views of Hughes and Hughes (2013) and Maister (2003), it appears that innovation strategy in professional service firm should be skewed

more towards societal needs and prerequisites or, in other words, to the client market place rather than to the other two goals of professional firms: satisfaction of staff and profitability. Evidence that suggests what is done in QS firms is sparse hence, there is an urgent need for an empirical study to clearly show which of the three generic goals of the professional service firms (service to client and society, satisfaction of the staff and profitability for shareholders) are being met and how?

4.4 The Size of Firms

Firms generally and professional service firms in particular are seen and treated on the same pedestal over the years irrespective of size (Keats and Bracker, 1988) because the existing theories of the firm make no distinction in size hence literature of the small firm lacks its own theories and empirical base (Glueck and Mescon, 1985; Robinson and Pearce, 1984; Keats and Bracker, 1988). Recent discussions however (Gann and Salter, 2000; Sexton and Barrett, 2003b; Barrett *et al*., 2008) are outlining the distinctive characteristics of the small firm and the need for separate theories of the small firm particularly when considered in the context of innovation.

Ogunsemi *et al.* (2013, p. 8) describe the size of QS firms in Nigeria as small with "low carrying capacity" of mostly one to three employees. Of course there is no generally accepted uniform definition of the size of small firms (Storey, 1998) and many authors have recommended different measures of size including number of employees, profit, turnover and net worth (Barrett *et al.* 2008). However, the European Commission (2003) provides a measure of size in the number of employees that could be used to classify enterprises within the European Union for planning purposes as:

Micro enterprises: those with 0-9 employees
Small enterprises: those with 10-49 employees
Medium enterprises: those with 50-249 employees

However, knowledge-based organisations have their peculiar characteristics (Egbu, 2012a) and these affect their business concerns. The implication of this is that the generic employees' classification offered by the European Commission may not be appropriate for QS firms as knowledge-based firms. Sexton and Barrett (2003b) argue that small firms have low financial resources compared to the large firms and may be reluctant in engaging in innovation because its primary goal is more akin to survival rather than growth (Barrett

and Sexton, 2006). Although Christensen (2003) argues that small firms are more positioned than the large firms to undertake disruptive innovation, it is doubtful if this applies to the professional service firms, as the product of the professional service firm is intangible and very much unlike the tangibility of the products referred to by Christensen (2003).

Although in Nigeria neither the Nigerian Institute of Quantity Surveyors nor the Quantity Surveyors Registration Board of Nigeria classify QS firms into sizes, evidence from Ogunsemi *et al.* (2013) and ideas from Murphy (2013) could classify QS firms in Nigeria into the following categories:

1. Small (1-8 employees)
2. Medium (9-20 employees)
3. Large (over 20 employees)

This classification is therefore adopted in this study.

4.5 The Nature and Structure of QS firms in Nigeria

4.5.1 Registrations

QS firms in Nigeria go through a two-stage registration system: through the Nigerian Institute of Quantity Surveyors (NIQS) and the Quantity Surveyors Registration Board of Nigeria (QSRBN) before they are registered to practice. The NIQS is the professional association for all quantity surveyors and it acts like a pressure group engaged in the professional training, setting of standards of practice and supporting its members through continuous professional development and other activities like workshops and seminars (NIQS, 2019). It operates with a head office in Abuja, the nation's capital, and with State Chapters in almost all the 36 States of the Federation.

The QSRBN is the Government regulatory agency established through the QSRBN Decree (1986) Cap 383 LFRN 1990 and charged with the responsibility of determining who is qualified to practice QS in Nigeria, setting of standards for the practice of QS, reviewing those standards from time to time and regularly publishing the names of those who are qualified to practice QS in Nigeria (QSRBN, 2019). Before approaching both the NIQS and the QSRBN for registration, each firm must first be registered to do business in Nigeria by the Corporate Affairs Commission (CAC). As at February 2019, information

supplied from the NIQS's database shows that there were 642 qualified QS firms and some 4,127 qualified members in Nigeria. The QSRBN however as at February 2019 has a total of 3,591 registered quantity surveyors and 340 registered firms in Nigeria.

4.5.2 Structure

Johnson and Scholes (1999) opine that what gives an organisation the ability to perform its functions are its resources, prime of which is its people. Hence, the structure of an organisation is about how its people are organised and co-ordinated in the performance of their individual roles. Johnson and Scholes (1999) classify organisation structure into: *simple, functional, multidivisional, holding company* and *matrix* structures. They see the *simple* structure as one where there is no formal structure and the organisation is run by a single individual who performs most of the functions with one or two assistants. This structure happens in very small organisations, which may be able to operate successfully initially but may choke subsequently when the volume of work increases. Simple structure could therefore be classified as a first step towards the development of a robust organisation structure.

The functional structure is an organisation structure that is "based on the primary activities that have to be carried out" within an organisation. These activities include production, marketing, finance and accounting and, human resource management (Johnson and Scholes, 1999, p. 403). The primary advantages of the functional organisation structure are that they give clear definitions of responsibilities and simplify control mechanism. However, its drawbacks are the lack of co-ordination between functions as each function sometimes behaves like a silo. Multidivisional organisation structure happens where the organisation is structured along business units, products or geographical areas (Johnson and Scholes, 1999). Due to the variability in the products and/or markets of the company, it may not be feasible to organise the whole organisation under the functional arrangement. Hence, this will necessitate the creation of several divisions to take care of the identified package units in which each division operates a partially independent sub-structure under the company. A holding company structure happens where there is an investment company that holds equity participation in a number of independent companies and the holding company has control over the buying and selling of these independent companies (Johnson and Scholes, 1999). The holding company will seldom be involved in the daily operations

and management of the individual companies but it will decide on issues relating to mergers and acquisition of such independent companies due to its controlling shares.

The matrix organisation structure is a hybrid of the functional structure and the project-based structure and it tries to harness the advantages of both the functional and project-based organisation through cross-overlaps, which also reduce the disadvantages of both to the barest minimum. The hybrid brings on board the clear-cut identification of functional responsibilities and combines it with the overlapping management of unique projects, products or strategic business units as the case may be. In other words, while the silos effect of the functional structure is removed, it continues to enjoy the clear-cut functional identification and ease of management control. Although the matrix structure improves the quality of decision-making, its notable disadvantage is that of conflicts of whose authority takes precedence between the functional line manager and the project line manager (Johnson and Scholes, 1999). This could lead to serious delays in decision making where there are no established guidelines to follow. Every learning and innovative organisation therefore needs to proactively deal with these conflicts, through appropriate guidelines, long before the conflicts materialise.

While Olanipekun (2012) opines that many QS firms in Nigeria operate the matrix organisation structure (Figure 4.1), Ogunsemi *et al.* (2013) describe QS firms as small with low carrying capacity. With a principal partner at the head of the matrix organisation, it is divided into two major parts. The first part is structured along a functional organogram with cost management, project management and infrastructure, as the different functions. The second part which overlaps the functional part is divided into the different projects. It could therefore be taken that QS firms in Nigeria essentially operate both the *simple* and the *matrix* structure if considered along the studies of Olanipekun (2012) and Ogunsemi *et al.* (2013). The simple structure is essentially a one-man squad with no formal structure while the matrix structure is a combination of the functional and project-based structure as shown in Figure 4.1.

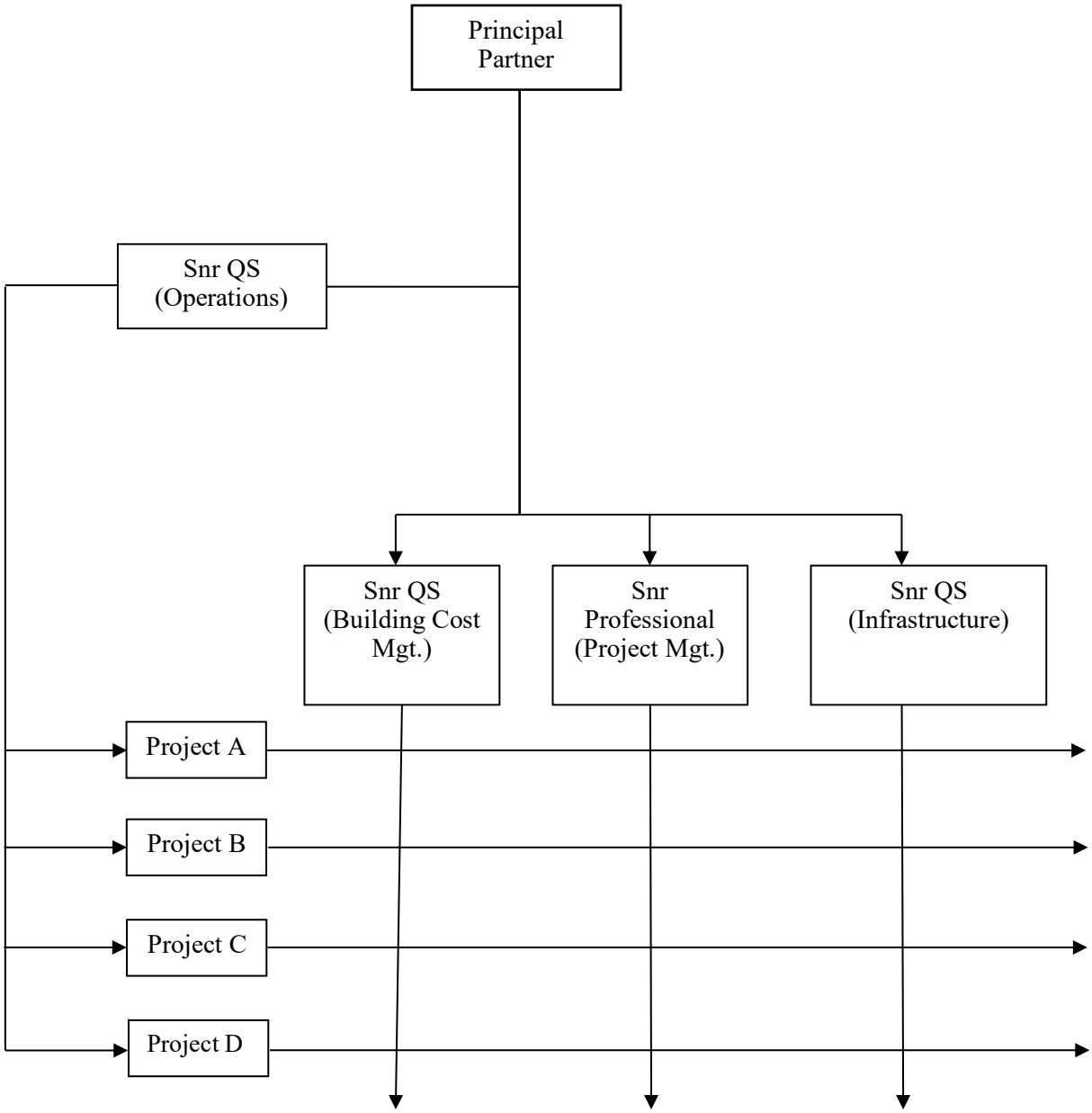


Figure 4.1: Typical Matrix Organogram

According to the records of NIQS in 2015, there were 555 QS firms in Nigeria with only 3,378 members qualified to practice QS in Nigeria (NIQS, 2015, p. 19). This gives an average of 6 persons per firm, assuming they all work for professional QS firms. From the database of NIQS by February 2019 the number of firms have risen to 642 while the total number of qualified members marginally increased to 4,127 thereby giving an average of 6.4 persons per firm. However, if this figure is shared between the public and private sectors, the net average number of qualified quantity surveyors per firm would be ridiculously low and this would seem to much more support the views of Ogunsemi *et al.*

(2013) of small firms with low carrying capacity than that of Olanipekun (2012) of matrix organisational structure.

It is a general knowledge that Nigeria has a bloated civil service (Punch, 2017) and that Governments, at all levels, are the largest employer of labour. It could therefore be deduced that the probability of the public sector employing higher proportion of the existing qualified quantity surveyors than the professional firms doing the same is very high. There are no data however on the actual number of qualified quantity surveyors who work in professional firms and it may be very difficult to compute because some who work for the public sector also establish registered private QS firms alongside their public sector engagements. However, Oke *et al.* (2016) submit that the average number of qualified professionals per firm in a population of 57 firms in the Lagos State Chapter of NIQS is 5.5 persons. Although they consider this figure as very low but it could even be much lower when a national average is computed because the Lagos State Chapter is the home to the frontline QS firms in Nigeria and would have, most naturally, employed more quantity surveyors than in each of the remaining 36 State Chapters.

4.5.3 Level of Innovation.

According to Oke and Ogunsemi (2009), many QS firms embrace the ICT revolution whereby spreadsheets and other basic applications are used in the day-to-day operations of firms. However, according to Anunike (2011), new software that go beyond the basic applications are seldom used because of the cost of procuring the software and the dearth of jobs on which the software could to be used. With about 642 QS firms and only 4,127 qualified members, a great number of who probably work in civil service, contractors, manufacturers, banks and other organisations; the number of qualified members working in firms appear to be very low. The impact of this is more pronounced when it is compared with the Nigerian population of over 175 million people and a GDP of $405 billion as at 2016. With the low carrying capacity, poor pay and poor mentorship programmes in QS firms in Nigeria (Oke *et al.,* 2016), the level of innovation in the firms appears to be very low and needs to be investigated in the absence of existing studies.

Oyediran (2011) challenges the strategies used by many QS firms in sourcing for jobs whereby they rely almost completely on architectural firms. He argues that the future of any professional QS firm lies in its ability to secure commissions directly from employers.

Finally, he contends that in order to build firms that will be able to play at the global stage, there is need for the Nigerian QS firms to build alliances, partnerships and collaborations with clients and other firms both locally and internationally. These appear to be a requirements of resource-push and market-pull innovation. Unfortunately, the present ownership structures of many of the firms are heavily skewed towards sole proprietorship (Ogunsemi *et al.,* 2013) and this could affect the ability of the firms to innovate and to take on large and complex projects. And with the increasing competition from international QS firms who are brought into the country as part of the funding package for the internationally financed projects particularly from China, there is an urgent need for the Nigerian QS firm to change strategy on size and corporate structure to engender increasing innovation and ensure survival and growth.

This is not to say that QS firms in Nigeria do not innovate but that they could do more. Of course, Barrett *et al.* (2007) reject the thesis that construction professional firms do not innovate. They opine that due to the hidden nature of innovation in most construction and professional firms, the existing instruments and methodology of identifying and collating such innovations are inadequate. This brings innovation in construction professional service firms into the framework of tacit knowledge (Polanyi, 1966). Subsequently, Aouad *et al.* (2010) opine that the journey seems to be far and therefore require purposeful research at different levels and points of innovation in a firm's operation. This study also resonates with the essence of this call from Aouad *et al.* (2010).

4.6 Summary

The chapter recognised the four key components of a profession as: the recognised body of knowledge, barrier to entry, mutual recognition and, meeting the needs of the society. The waning trust of society in the ability of professions to meet societal needs is an evidence that the professions are failing in this regard. In the context of the professional service firms these goals are expressed as service to client, satisfaction to the employees and profitable success to the owners. There is a gap in knowledge on how professional service firms are meeting these goals through innovative means.

The sizes of the Nigerian professional QS firms are generally small with low carrying capacity. However, there appears to be no evidence to show if the sizes affect the ability of the firms to innovate or not. An appropriate study may shed some light on this critical area.

There is evidence that some Nigerian QS firms have embraced ICT but there is no evidence that the embrace of ICT is linked to awareness of innovation. Further studies are required to make the necessary linkage.

CHAPTER FIVE

5.0 PRE-CONTRACT PRACTICE

5.1 Introduction

This thesis is focused on innovation of quantity surveying (QS) firms in Nigeria during the pre-contract practice hence; a look at the relevant literature on pre-contract practice is central to its successful outcome. This chapter considers relevant literatures in pre-contract practice and situates these within the purview of the briefing process, procurement system and pre-contract documentation. It considers the briefing process as a subset of the pre-contract practice and subsequently x-rays the relevant procurement systems drawing out the key features as it relates to pre-contract timelines and innovation. Finally, it highlights the basic issues in contract documentation.

5.2 Client Briefing Process

Barrett *et al.* (1996) define briefing as, "a systematic process by which client ideas are realised" while Shen *et al.* (2004) see a brief as the aggregation of all client requirements and intentions on a construction project. Client ideas about any proposed development provide the first guidance on the issues to be considered about designing and realising the physical infrastructure. It gives the first answer to the question, what does the client want? Barrett *et al.* (1996) see the process of building construction in itself as innovation, which is created by the client with the intention of assuaging a plethora of demands like the need for more production space or more office space. Through the briefing process, client ideas are communicated to all stakeholders of the design process.

However, several studies starting with the Banwell Report of 1964 (Ministry of Public Buildings and Works, 1964) have alluded to insufficient definition of project requirements as a critical factor militating against an efficient and effective construction process particularly at the pre-contract stage. Other studies with the same conclusions are Latham (1994), Egan (1998), Wolstenholme (2009) and most recently HM Government (2013) through the *Construction 2025* strategy, which places attention on the five topical areas of people, smartness, sustainability, growth and leadership. These studies, arguably, put the problem of poor project definition squarely on the shortcomings of the briefing process.

This underscores the need to put more attention on the briefing section of the development process.

While some attempts have been made to address the briefing problems, Barrett *et al.* (1999) opines that the reasons why these attempts have not been effective are:

1. Clients are paying lip service to some of the attempts directed at reducing the briefing problems. For instance, many clients appoint representatives as the link between the client and the consultants but many of such clients fail to accord the representatives the necessary authority to enable them function properly.
2. Some of the brilliant suggestions towards ameliorating the problems are not carried out. For example, one of the key suggestions is that clients should endeavour to always check how the consultants' designs meet the requirements of the brief. Unfortunately, this is rarely done.
3. A few suggestions that were carried out are not working well because of the effects of some external factors, which were not considered *ab initio*.

Also, in the views of Shen *et al.* (2004), the existing briefing guides are not working at optimum level because they are too general in nature. Shen *et al.* (2004) therefore present a structural framework to address this shortcoming. This framework integrates the Value Management (VM) techniques with Function Analysis System Technique (FAST) and Functional Performance Specification (FPS) to, "systematically identify and clarify client requirements, and to arrive at a precise understanding and definition of these requirements" (Shen *et al.* 2004, p. 215). The framework in four phases comprises the preparation phase, information phase, analysis phase and evaluation phase.

Since different stakeholders have different understanding of the project intentions, it therefore becomes important for a methodology to be adopted, which will enable all stakeholders to have the same understanding of the import and objectives of the project. This approach should essentially be a value management approach. Green (1992) initially presents the Simple Multi-Attribute Rating Technique (SMART) methodology, which could be used to achieve a common understanding on project objectives at the briefing and outline design stages of project development. The SMART methodology is essentially a structuring methodology rather than a decision-making methodology (Shen *et al.*, 2004).

The Shen *et al.* (2004) model therefore appears to be an improvement on Green's (1992) model due to its combination of Value Management with the FAST diagram and FPS.

The FAST Diagram displays the functional relationship in a diagram form hence, it should not be seen as an end in itself but the beginning of the end. FPS provides a complementary document in which the client expresses his needs in functions relating to the user. FPS also incorporates evaluation criteria and the levels of satisfaction required (Shen *et al.*, 2004). With the level of flexibility allowed, FPS, which comes up immediately after the functions are established, provides the accurate definition of the needs to which the functions must meet (Shen *et al.*, 2004).

Many clients are trying to shorten the timeline of the briefing process (Shen *et al.*, 2004) and this could further complicate the problems of existing compressed timelines during pre-contract documentation as already discussed in Chapter 1. It could also make fuzzier, the stakeholders common understanding of the project objectives as more time may be needed by each stakeholder to digest, interpret and understand the project objectives. Perhaps the adoption of the methodology prescribed by Shen *et al.* (2004) which promises to shorten the briefing period through a framework that enables a quick understanding and interpretation of the client requirements could probably allow more time for the pre-contract timeline. However, there appears to be no empirical evidence on the performance-to-claim of the framework in practice.

5.3 Procurement Systems

The combination of all activities engaged on by the client in obtaining a built asset is referred to as procurement system (Franks, 1998). The decision on which procurement system to be used on a project has to be made at inception during the pre-contract period and once this decision is made all documentations have to follow that system accordingly. There are a plethora of procurement systems depending on the type of project to be procured, the type of client and the inherent risks to be managed. Perhaps this informs Bunn (2001) to opine that the act of procurement is the act of passing risks. Several suggestions have been provided as the reasons for choosing a procurement method. These include time, cost, quality, degree of client involvement, flexibility and risk.

However, Ojo (2012) opines that clients in Nigeria do not have a systematic procedure for choosing a procurement system and that they base it mostly on familiarity with a particular system. He therefore offers a framework that could help the clients in selecting appropriate procurement method systematically. Oladapo (2000) opines that a good procurement system should be able to achieve project delivery in a competitive environment with effective cost and within an efficient time. For brevity and in accordance with international standard, Balogun (2001) classifies all the procurement systems in Nigeria into the following categories:

1. Traditional system
2. Design and build system
3. Management system
4. Other systems

Even though the above classification shall be used as the basis for discussing procurement methods, it is apt to note that Part IV of the Public Procurement Regulation 2007 (PPR) of the Bureau of Public Procurement has a different classification. It classifies the procurement methods to be used by the procuring entities i.e. Ministries, Departments and Agencies (MDAs), into the following categories:

1. National competitive bidding
2. International competitive bidding
3. Two stage bidding
4. Restricted bidding
5. Selective bidding
6. Single source procurement

From literature therefore, procurement system should be seen as the sum of all activities engaged in obtaining a built asset hence, the PPR classification therefore appears to relate to a subset of the procurement i.e. bidding, as against the complete procurement. For this reason, the PPR methods are considered as bidding/tendering methods instead of procurement methods.

5.3.1 Traditional System

The traditional system works on the premise that the designs from the brief could be completely conceived, developed and produced before a contractor is called in to offer a

bid (Balogun, 2001). This type of procurement in Nigeria is based on the Public Procurement Act 2007, and the various adaptations of JCT 63 and 80. In 2018 the Nigerian Institute of Quantity Surveyors, acting on behalf of the Nigerian Construction Industry, produced the first edition of The Nigerian Construction Industry Standard Forms Conditions of Contract, which is an adaptation of JCT 2011. In the study of Ogunsanmi and Bamisile (1997), the traditional system accounts for about 65% of the procurement systems used in Nigeria. The promulgation of the Public Procurement Act (PPA) 2007 makes it mandatory for all projects which derive a minimum of 35% of its fund from the Federal Government appropriation to procure in accordance with the Act. With this directive, it is more likely that the proportion of projects using the traditional system in Nigeria has risen a lot more than the 1997 figure.

The traditional system should give the client some high probability of certainty of tender price since all the design inputs are supposedly provided for the bidder to price accordingly. Due to the high adversarial tendencies of the traditional system however, it is most likely to result into delays and an elongated completion period (Balogun, 2001). With clients looking for project delivery within very short timelines (Shen *et al.*, 2004), it appears that the traditional procurement system with its elongated project delivery timeline, is more likely to compound the problem of compressed timelines during the pre-contract practice in Nigeria. This also underscores the need for professional QS firms to develop innovative ways in preparing pre-contract documentation within short timelines.

5.3.2 Design and Build System

The design and build system is essentially meant to address the shortcomings of the traditional system. The expertise of the contractor is brought in early in the design development and he is responsible for both the design and the construction of the built asset. Usually based on the adaptation of JCT 81 and some sections of the PPA 2007, the design and build system is more likely to deliver the project within cost and time. In 2018 the Nigerian Institute of Quantity Surveyors, acting on behalf of the Nigerian Construction Industry, produced the first edition of The Nigerian Construction Industry Design and Build Conditions of Contract, which is an adaptation of JCT 2011. However, the major criticism of Design and Build form is its inability to produce a design that meets the quality of client requirements since the design and construction functions are concentrated on the contractor thereby with little or no checks and balances that underpin the traditional

system. Nevertheless, due to its advantages, design and build appears to provide a framework which could assist in the management of the compressed pre-contract timelines.

5.3.3 Management System

Construction management and management contracting are the two types of management procurement systems in Nigeria and are based on the adaptation of JCT 87. The basic difference between the two is the level of client involvement, which is greater in construction management than in management contracting. Both systems are strictly about breaking down of the total work into work packages to be executed by package subcontractors under the coordination and supervision of either a construction manager or a management contractor who manages the project in return for a lump sum or a percentage fee (Balogun, 2001). The unique advantage of this system is the ability to complete the project on time and the opportunity for the client to be directly involved in the delivery. Although this system is rarely used in Nigeria, compressed pre-contract timeline could benefit from the timely completion of the project, which is inherent in the system.

5.3.4 Other Systems

Other unclassified procurement systems like Direct Labour, fall under this category. Direct Labour involves where the client purchases the materials and "utilises its internal labour to execute the projects directly instead of employing a contractor" (Balogun, 2001, p. 17). There is a section of PPA 2007 that covers direct procurement and it is usually for projects of small sizes. Since the operation is small and the in-house staff are engaged on the project, the issue of compressed pre-contract timelines may therefore not be affected by this procurement system.

5.4 Contract Documentation

The type of contract documents to be prepared on a project depends on the type of conditions of contract being used for the contractual arrangements. Conditions of contract in use presently in Nigeria are the Joint Contracts Tribunal (JCT) Suites and its adaptations, the Bureau for Public Procurement (BPP) conditions, the International

Federation of Consulting Engineers (FIDIC) Suites, the Institution of Civil Engineers (ICE) Suites and its adaptations and, the New Engineering Contracts (NEC). Although NEC is seldom used in Nigeria, it is gaining increasing traction in the UK in lieu of the ICE conditions. Ashworth and Hogg (2007) however suggest the following contact documents where the JCT and ICE conditions of contract are employed:

JCT Contracts

1. Contract drawings
2. Contract bills
3. Technical specifications
4. Articles of agreement
5. Conditions of contract
6. Appendix

ICE Contracts

1. Conditions of contract
2. Specification
3. Drawings
4. Bills of quantities
5. Tender
6. Written acceptance
7. Contract agreement

The BPP conditions of contract has the following documents as the relevant contract documents where the BPP conditions of contract is used:

1. General conditions of contract (GCC)
2. Special conditions of contract (SCC)
3. Standard tender and contract forms
4. Bills of quantities
5. General specifications
6. Particular specifications
7. Drawings

The drawings prepared by the architect and the engineers provide the pictorial representation of the client requirements. While the architect deals with functions through

space allocation within the ambits of regulation and sustainability and the structural engineer deals with the stability and safety of the structure, the services engineers bring in services that make the building habitable. The quantity surveyor also prepares the bills of quantities that break down the designed project into standard units of work items to aid pricing and cost negotiation.

The essence of the contract documents is to ensure that all project information are harmonised in a standard form and made available, on time, to the bidder in order to form a uniform basis upon which to present a tender and subsequently as a basis for contract formulation. There are however concerns about "insufficient time being made available for the pre-contract design work" (Ashworth and Hogg, 2007, p. 247) and that this could prevent a seamless pre-contract process. This view resonates with the earlier views of Barrett *et al* (1996) and Shen *et al.* (2004) on the problems of inadequate time given to the briefing process. Literature is sparse, particularly in Nigeria, on how the consultants have been responding to the shortage of time in the production of the contract documents. This is a gap in knowledge, which this study is meant to address.

5.5 Summary

The pre-contract practice deals with the actions and decisions taken on a proposed project development before a contract is formulated. These include the development of the client brief, the choice of the procurement system and the preparation of the contract documents. This chapter noticed that the problem of insufficiency of project definition during the client briefing stage is still predominant irrespective of the type of procurement system used. In Nigeria, a high proportion of projects are also procured through the traditional method with its attendant propensity for elongated procurement timeline, which could further tighten the already compressed pre-contract timelines. The result of these pressures is the lack of adequate time to produce the contract documents thereby bringing concerns on quality and whether the documents so produced meet the client intentions. How QS firms are responding to the inadequate pre-contract time is a gap in knowledge that requires further investigation.

CHAPTER SIX

6.0 RESEARCH METHODOLOGY: THE FUNDAMENTALS

6.1 Introduction

Having grounded the research problem in practice in Chapter 1, this chapter puts the problem being investigated within the context of a research methodology. Research methodology could be seen as the system of inquiry or the complete process of inquiry (Kaplan, 1964; Groat and Wang, 2013). In this chapter, the consideration of the methodology of the research engagement is demonstrated through a systematic approach of investigating the problem in the right context by considering the unique habitat of the problem, its morphology and the philosophical orientation of the researcher.

According to Groat and Wang (2013), every credible research engagement must have been framed by a system of enquiry, which may sometimes be implicit in some fuzzy contexts on an objectivity-subjectivity continuum (Leiringer, 2003). Dainty (2008, p. 3) sees research methodology as, "the rationale and philosophical assumptions that underlie a particular study". It appears therefore that the overriding criteria in establishing the research methodology are the nature of the problem being investigated (Punch, 2006; Knight and Turnbull, 2008; Groat and Wang, 2013) and the philosophical orientation of the researcher (Yin, 2009).

In an exploration towards unearthing the nature of the research problem in an attempt to defining a methodology for investigation, two concepts: *habitat* and *morphology* of the problem appear very relevant and are hereafter considered. The theories underpinning problem identification/understanding and the links to *habitat* and *morphology* are also discussed. The results of these discussions provide the need to adopt and use the nested model in appraising the relevant philosophical orientation, research approaches and research techniques. While the research approaches provide a prelude to selecting an appropriate method, research techniques provide the system for collecting and analysing data. Finally, a research design is provided to guide the study.

6.2 Habitat of Research Problem

Habitat, a concept borrowed from ecology and environmental science, can be helpful in the formulation of a research problem. Habitat is the natural abode of animate objects, or where the objects could be found to operate. Odum (1971, p. 234) defines habitat as, "the place where an organism lives, or the place where one could go to find it". This concept states that the population and behaviour of an animate object could be understood by studying its habitat. While Morrison *et al.* (2006) see habitat simply as an abode, Krausman (1999) extends the definition and refers to habitat in the context of the resources and conditions, like food, water and cover, that provide the environment which makes occupancy possible. However, recent studies on habitat (Mitchell, 2005; Kearney, 2006), have extended the meanings of habitat to include the organism's biotic and abiotic environments (with life and devoid of life respectively) and biotic factors (competition or predation). This means that habitat is not only the physical environment but also the biotic interactions within the environment.

Applying the ecology concept of habitat to this study makes it clear that the habitat of the problem being investigated here is the quantity surveying QS firm and the built environment. Kast and Rosenzweig (1985) see an organisation as a living social system. By extension therefore, a research problem in an organisation, like a QS firm, may be viewed to exist within its habitat and it could be understood through a close examination of this habitat. If you want to understand an organisational problem, it is only natural to visit the problem at "home", its natural abode. It is therefore logical to understand the practice-based problem through instruments that are both amenable to practice and comfortable within the built environment discipline (Gray, 1996). The support for this approach is found in Mills (1959, p. 196) who opines that:

> You must learn to use your life experience in your intellectual work: continually to examine and interpret it. In this sense craftsmanship is the centre of yourself and you are personally involved in every intellectual product upon which you may work. Life and intellectual work should not be separate.

Current viewpoints on practice-based research further support this approach (please see Eraut, 1994; Gibbons *et al*., 1994; Remenyi *et al*., 1998; Saunders *et al*., 2007; Drake and Heath, 2011). In *practice-based* research, the research problem is formed from the interactions of the researcher with the professional practice environment in the quest for

delivering value to individual clients or responding to the stakeholder's interests (Jarvis, 1999). Kast and Rosenzweig (1985) opine that an organisation is an open system, which can be understood only in terms of its unique parts. The systems approach in Figure 6.1 shows the organisation as a system comprising two broad divisions of habitat: internal and external. The internal environment consists of technical sub-system, structural sub-system, psychosocial sub-system, goals and value sub-system and managerial sub-system (Kast and Rosenzweig, 1985). The external environment may include the political, economic, social and technology sub-systems (Kast and Rosenzweig, 1985). The internal and external environments and the series of mechanistic interactions within and between them could therefore be inferred to constitute the habitat of the practice-based problem within the built environment.

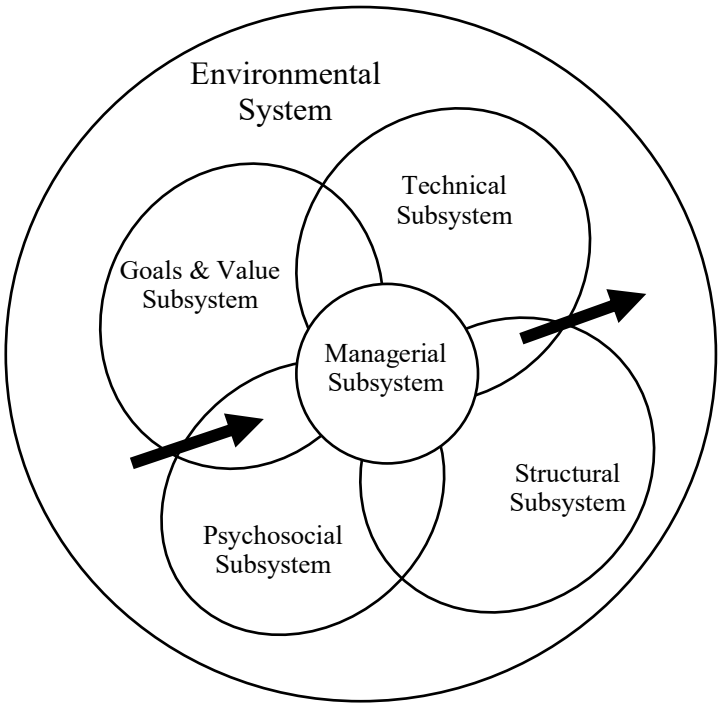


Figure 6.1: Practice-Based Research Habitat (after Kast & Rosenzweig, 1985)

In the opinion of Winter *et al.* (2000), the major consideration of practice-based research is hinged on the reliability, wisdom and goodness of practice knowledge. The practice knowledge is generated from the interactions between the various sub-systems in the organisation. Although, it is an age-long discourse on whether knowledge should reflect its subject or be distant from it, recent commentaries seem to agree that no research engagement could claim a complete independence from its subject in the understanding of phenomena (Flyvbjerg, 2006, p. 235).

The *built environment* as an amalgam of heterogeneous disciplines is now a common terminology in the global academic community (Griffiths, 2004; Chynoweth, 2009). Even though some researchers see the built environment as many disciplines, Barrett (2008) views it as a research discipline that houses other areas of practice like QS. The latter view presupposes that the built environment, at the end of the day, must have its own way or process of interpreting human actions within the discipline. This view is sociologically expressed by Herbert Blumer when he states in Denzin, (2009, p. 3) that:

> We can, and I think must, look upon human life as chiefly a vast interpretative process in which people, singly and collectively, guide themselves by defining the objects, events and situations which they encounter…Any scheme designed to analyse human group life in its general character has to fit this process of interpretation

Consequently, within a professional practice organisation in the built environment, the way in which such interpretative process is carried out and the knowledge generated from it must take adequate cognisance of the *habitat* of the problem under investigation as shown in Figure 6.1 above. It is then, hopefully, that a realistic and contextual meaning could be obtained through the interpretative process.

6.3 Morphology of Research Problem

Morphology, a term borrowed from biology, deals with the study of the form, shape or structure of living things, problems or phenomena. The complexity of an organisational problem may therefore be seen from its morphology. For an effective problem resolution, Volkema (1983) argues for an appropriate problem formulation. This, according to Volkema (1983, p. 640), is due to, "the strong relationship that exists between the way a problem is represented and the solutions or ideas the representation can produce". He further opines that the amount of time and effort spent in problem formulation are affected by the following factors:

1. The complexity of the problem
2. The environment of the problem
3. The capacity and experience of the researcher
4. The adopted formulation process

The complexity of a problem affects its resolution to a larger extent. A complex system converts inputs to outputs in nonlinear ways and its components interact in many different ways and with many different feedback loops (Anderson, 1999). The real issue is the lack of agreement on what constitutes a problem. From Duncker (1945) idea of seeing a problem as a conflict up to *de* Bono (1970) idea of viewing a problem as the difference between what is and what should be, every definition of a problem seems to be contextual and there is no agreement to date on a unified definition. The environment (habitat) of the problem has been discussed under section 6.2 and it includes the internal and external environments interacting together with the problem to produce a complex set of characteristics that define the problem in its habitat.

The capacity and experience of the researcher relates with the ability of the researcher to properly formulate a problem in view of the physiological limitations of the human brain and the perception and experience differentials of individual researchers (Volkema, 1983). A number of factors that include the environment, the experience of the researcher and the complexity of the problem determine the formulation process adopted (Volkema, 1983). For instance, the formulation process of a simple problem will be completely different from that of nonlinear or wicked problems.

Citing the seminal work of MacCrimmon and Taylor (1976) on *Decision making and problem solving*, Volkema (1983) identifies four categories of strategies for reducing the complexity in problem formulation and diagnosis:

- Identification of problem delimitation
- Examination of relevant changes in the decision environment
- Breaking down of complex problems into smaller and manageable sub-problems
- Focusing on the controllable components in problem decision situation

Problem delimitation is meant to determine the boundaries of the problem as a critical aspect of problem identification and understanding. As such, problem delimitation could be done explicitly through existing rules, guidelines and laws. For instance, a research problem could be expressly delimited to a particular geographical area (just like the problem of this study is delimited to Nigeria) or within a specific timeframe. Also, problem delimitation could be done implicitly by focusing mainly on the intended function that the problem resolution is meant to achieve instead of getting bogged down with breaking the problem into manageable components that may sometimes prove very

difficult. This technique is similar to the value engineering techniques of Function Analysis System Techniques (FAST) diagrams (Miles, 2015) in which attention is focused on the function of an intention, be it for design component or problem solving, in helping to achieve value in cost or other decision making.

Changes always happen in the problem environment and the identification and examination of those changes that inform the problem in the first instance may provide an idea on how to reduce the complexity of the problem's formulation and diagnosis. There is the need to walk back into how it all started to look at the changes in the environment that caused the problem at the initial stage and what lessons could be learnt from the origin and structures of those changes. These lessons could be ploughed back to give a direction on how to reduce the complexity of the formulation process of the problem.

The need to break down a complex problem into manageable sub-problems enables easy resolution of problems. A typical example of this is the presentation of the aim and objectives of this thesis as done in Chapter 1. Suffice it to say that the overriding aim of this research is to investigate how QS practice firms innovate and how they respond, through innovation, to the pressures of compressed pre-contract timelines during pre-contract documentation in Nigeria. This is the real problem that the research is desirous of finding solutions to. However, this aim is divided into manageable sub-problems called the objectives as follows:

1. To review existing literature on timing, process improvement and innovation as they relate to compressed time demands during pre-contract practice.
2. To situate this study within the framework of practice-led research in the built environment and propose a theoretical model for practice-based doctoral research.
3. To examine how QS firms innovate in practice and develop a model of innovation process in QS firms.
4. To explore how QS firms, through innovation, do effectively respond to the pressures of compressed pre-contract timelines during pre-contract documentation.
5. To propose recommendations for action for QS practitioners and policy-makers in Nigeria.

Each of the listed five objectives could easily be tracked, managed, resolved and measured. Finally, there is the need to focus attention mainly on those components of the problem that could easily be controlled. The theory to support this could be found in the *Pareto*

principle or the *80-20 rule.* This principle means that there is considerable disproportion in the relative importance of the components of the problems to its resolution. For instance, 80% of the effects are provided by 20% of causes (Naoum *et al.,* 2016). Therefore, it could be inferred using the Pareto principle, that resolving the problem of the main 20% of the components is more likely to provide 80% of the resolution for the entire problem. Hence, it would be efficient and wise to concentrate on controlling those 20% components that could quickly enable the achievement of the 80% resolution.

6.4 Establishment of the Research Problem

Ackoff (1981) opines that for any situation to be classified as a problem, it must meet the following three conditions:

1. There must be alternative courses of action that could be taken on it.
2. Any of such action taken on the situation must have the potential of having serious consequences.
3. There must exist doubt on which alternative action to be taken.

After meeting these conditions, Ackoff (1981) suggests that the identified problem could then be dealt with in three different ways: *resolution*, *solution* and *dissolution*.

To resolve a problem is to choose a course of action that is "good enough, that *satisfices* (satisfies and suffices)" for that situation (Ackoff 1981, p. 20). This is generally referred to as the clinical approach to problem management and it relies heavily on experience and qualitative worldview. While resolution deals with the *good enough action*, solution is concerned with the *best action* that "optimises" (Ackoff 1981, p. 20) and this is classified as the research approach to problem management. It falls within the quantitative worldview and therefore relies heavily on the scientific methods, tools and techniques.

Finally, to dissolve a problem is to change the existing problem environment. For a problem to exist it must exist within a particular environment (Krausman, 1999) and once that environment is changed and a different environment is created, that initial problem is consequently dissolved (Ackoff, 1981). This approach is referred to as the design approach and it combines the benefits of both the clinical and the research approaches. In the opinion of Krausman (1999), the resources that the environment provides for a problem allow the problem to survive in that environment and once those resources are no more available, due to the change in the nature and structure of that environment, the problem

will cease to exist. The design oriented problem manager must, in addition to understanding the methods of the clinician and researcher, be able to design and invent. The approach espoused in this thesis is that of the designer which combines the features of the clinical, research and design tools and methods.

It is obvious that in defining the research problem, this study has looked into the practitioner-researcher's area of practice and research interest. It is also evident that the opinions of other professionals in the field have been sought on the same issue in order to determine if there is a divergence or convergence of views across practice (Nwachukwu, 2016). From the discussions on the practice background and research problem in Chapter 1, the research problem is formed from the persistent requests of clients (public construction project promoters) in Nigeria, for increasingly short timeline for pre-contract documentation. If consultants, particularly QS firms, continue to respond to client demands of pre-contract procurement documentation in the same old way of assuming the availability of adequate timeline in an environment where time is a scarce resource, it is obvious that QS firms may not be able to provide effective and efficient services. Nevertheless, the aim of this practice-based study is to bring research efforts to bear on practice by investigating how innovation, has been able to address the demand for compressed time during pre-contract documentation in the Nigerian construction industry.

Having established the research problem, the subsequent sections of this chapter would appraise the various options for a research methodology and recommend a methodology that is appropriate in consideration of the nature of the research problem, the research philosophy, research approaches and research techniques.

6.5 Research Methodology

Research methodology could be seen as the strategy or system of inquiry or the complete process of inquiry (Kaplan, 1964; Groat and Wang, 2013). Keraminiyage and Underwood (2013) opine that research methodology comprise the process of executing all the issues that form the key components of a research and which will underpin the design for that particular research. Kagioglou *et al*. (2000, p. 143) recommend using a methodology that is "sympathetic to the issues being investigated" whereby the nature and characteristics of the problem dictates the methodology to be used for its investigation. The ontological and epistemological position of a researcher, the research traditions within the discipline and,

the nature of the problems being investigated are critical factors in determining the research methodology to be applied (Dainty, 2008; Yin, 2009).

Due to the nature of this investigation in which there is need to harmonize all underlining issues on views, methods and techniques in a coherent and integrated structure, both the "research onions model" (Saunders *et al*., 2007) and the "nested model" (Kagioglou *et al*., 2000) are appropriate. However, the research model that is adopted in discussing the methodology in this investigation is the "Nested Model" (Kagioglou *et al*., 2000) as shown in Figure 6.2 because it is more succinct in addressing the key approaches and techniques. It comprises three distinct but integrated concentric circles: research philosophy, research approaches and research techniques. The analysis moves from the generalist or unifying philosophy of the outer circle to the specifics of the inner circles as discussed in the following subsections.

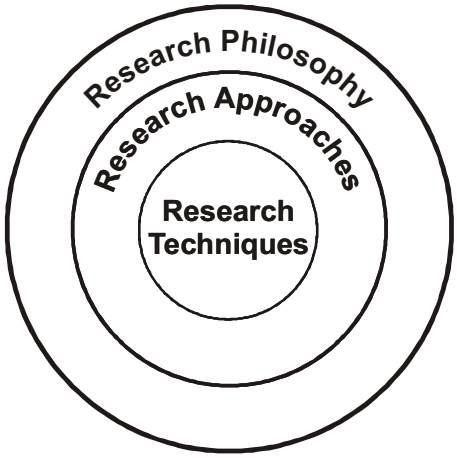


Figure 6.2: Nested Model (Adapted from Kagioglou *et al*., 2000)

6.6 Research Philosophy

Saunders *et al*. (2007) sees research philosophy as the way a researcher views the world. This involves what constitute reality otherwise referred to as the ontological assumptions, how the knowledge of this reality could be acquired otherwise referred to as epistemological perception and what value is attached to the understanding of this reality otherwise referred to as axiology (Aouad, 2013; Keraminiyage and Underwood, 2013). The research philosophical debates have been long-standing and are polarized on a continuum of different worldviews or paradigms. Leiringer (2003) identifies the different shades of the continuum as: induction-deduction, qualitative-quantitative, rationalism-

empiricism and science-social science. Knight and Turnbull (2008) point to the critical importance of properly situating a research within a particular epistemological foundation. Punch (2006) supports this assertion by agreeing that such an approach naturally leads to identifying the subsequent relevant research methods.

This research is about investigating innovation and how it has been used or not used in QS firms towards resolving the problem of compressed pre-contract timeline for contract documentation in Nigeria. This is about what people have been doing in their social environment, and it is most probable that this environment would affect how this activity is carried out. In other words, reality in this research is socially constructed. From the above viewpoint and using the categorization offered in Aouad (2013), the ontological position for this research is that of an idealist rather than a realist. The epistemological leaning is consequently interpretivist rather than positivist because opinions and feelings of people are being sought and these opinions need to be interpreted in order to understand the phenomenon.

Of note of course is the argument of Barrett and Barrett (2003, p. 762) for a "pragmatic-critical-realist position" (also see Johnson and Duberley, 2000) in which they argue for an objective ontology but a subjective epistemology for practice-based research. They align with the view that natural and social realities do have independent existence that predates human cognition (Johnson and Duberley, 2000, pp. 179-180). There are sound arguments to support this viewpoint particularly from Johnson and Duberley (2000). However, if on the strength of this argument, social reality does have independent existence then, the interactions of social actors should not have any effect on reality. But it appears that, in practice, the interactions of social actors do actually have effects on reality otherwise how then could one explain the position of social actors in the exercise of freewill, which in a way enables social actors to determine what constitute reality through their actions. The differences in these viewpoints could be anchored on the differences in ontological and epistemological perceptions of what constitutes reality and how its knowledge could be obtained. Researchers on both sides of the divide have extensively argued both views and there appears to be no agreed joint position apart from the bi-silos conundrum. It is therefore an age long discussion, which could hardly be resolved through a confined piece of work of this nature.

Suffice it to say that such arguments are beyond the object and capacity of this study hence, the position of this thesis is that; ontologically speaking, social reality is socially constructed and infused with relativism. This thesis therefore argues that any social understanding must have come about by being contextualised. Finally, on the position on axiology, since the opinions and views of the people would be affected in one way or the other by the latent views they hold on these issues, the axiological stance of this research is value-biased rather than value-neutral.

6.7 Research Approaches

With a research philosophy of idealism, interpretivism and value-laden, the research approaches are discussed in order to identify the approaches that would fit the research philosophy (Punch, 2006). There are many research approaches available for consideration: survey, experiment, action research, case study, archival research, ethnography, auto-ethnography and grounded theory. To narrow down the choices to a few approaches requires the consideration of the nature of the research engagement. The nature of the problem is that of exploring and understanding how QS firms respond through innovation to inadequate timeframe for pre-contract documentation in QS firms in Nigeria. The bulk of data to be collected would be in non-numeric form from interviews, documents and archival records. To derive meaning from these data, it has to be analysed and interpreted in a qualitative strategy (Robson, 2002; Punch, 2006) in what Egbu (2012b, p. 5) refers to as intending to "illuminate perceptions" and "gain greater insights and knowledge" about the phenomenon. From the above set metrics and also due to the fact that the research is qualitative in nature, any consideration of quantitatively based research approaches like surveys and experiments may then be effectively eliminated. Therefore, the following qualitative research methods are considered: ethnography, auto-ethnography, action research, grounded theory and case study.

6.7.1 Ethnography

Ethnography as a qualitative research method is directed towards obtaining the total picture of everyday activities within the context of the phenomenon being investigated (Creswell, 2003). It is aimed at understanding the meaning that the actors give to the phenomenon within their social interaction and, this necessitates the need for the investigator to be embedded within the environment where the investigation is being

carried out. Therefore, the principal instrument of data collection is the investigator. The single drawback of ethnography and why it is rejected for this investigation is the need for the investigator to be embedded with the actors in order to collect data that will drive and give meanings to the phenomenon. It is therefore not practicable, due to lack of time and other resources, for this investigator to be completely embedded in order to study the phenomenon.

6.7.2 Auto-ethnography

A lot of discussions have taken place on the arguments of the right distance of the researcher from the phenomenon. While the traditional positivistic paradigm pushes for a considerable distance wherein Lennon and Whitford (1994, p. 2) opine that, "genuine knowledge does not reflect the subject who produced it", Winter et al. (2000, p. 28) counter by espousing that, "a claim to practice-based knowledge is an obvious example of a claim to knowledge which is context-bound, and in which the subjectivity of the producer of the knowledge cannot be eliminated". Auto-ethnography is a research method about telling one's story in one's own voice. Wall (2006, p. 9) recognises "the voice of the insider being truer than that of the outsider". Auto ethnography, which tells personal stories and relate it to the cultural is founded on postmodern ideas and "exposes the flaws in our traditional reliance on neutrality and objectivity…. we cannot separate ourselves from what we do" (Wall, 2006, p. 9). Although auto-ethnography positions itself to providing very rich data, the concerns on ethical considerations may make it problematic because it is susceptible to being introspective, self-indulging and narcissistic (Mendez, 2013) as there are no generally agreed rules for its evaluation. However, Ellis (2007, p. 26) is of the strong opinion that, "auto-ethnography in itself is an ethical practice" and may not need an objective rule to guide it. Auto-ethnography is rejected here because the thesis is not investigating the firm of the researcher. Rather, it is investigating other QS firms.

6.7.3 Action Research

Action research is a qualitative research method, which has its origin in the works of Kurt Lewin, the social psychologist (Lewin, 1943). Its framework is based on studying an on-going system that requires change. Its methodology is by collecting appropriate data from that system, introducing some interventions by changing some variables of the system and observing the result of the new state of the system (Gill and Johnson, 2010). It could be a

one-off intervention but could also be a series of interventions introduced until the desirable state is achieved. As the aim of this research is to understand how to effectively respond to the compressed time for pre-contract documentation, action research presents a possible alternative approach to this study but it is rejected in this investigation because there is no adequate time to conduct longitudinal tracking needed for the method.

6.7.4 Grounded Theory

Grounded theory is a research method that is aimed at generating theory grounded in data from participants or practice (Creswell, 2007, Gibson and Hartman, 2014). Two different approaches, systematic and constructivist are used. The systematic approach is the classical approach developed by Glaser and Strauss and maintains a positivistic worldview with strict methodological adherence to processes. The constructivist approach developed by Charmaz maintains a relativist ontology with a subjective and socially constructed epistemology (Gibson and Hartman, 2014). However, whichever approach is followed, Dainty *et al.,* (2000, p. 229) identifies the three major drawbacks of grounded theory as "data overload, complex procedure and a lengthy analytical phase". This research approach is rejected because the aim of the investigation is not to generate theory.

6.7.5 Case Study

Yin (2009) provides the conditions under which case study becomes the most appropriate method for a research investigation. These are: when investigating a contemporary issue in a real life context, when asking the "why" and "how" questions, and when the researcher has little or no control over the research subject. The criticisms of case study as a research method stems from the debates between the proponents of knowledge creation from theoretical foundation and knowledge creation from practice. Proponents of theoretical knowledge opine that case study lacks rigour, as there is no standardized framework for carrying it out. They also opine that, at best, case study can be used for generating hypothesis whereby other methods are suitable for hypothesis testing and theory building (Flyvbjerg, 2006). Other criticisms are that it takes too long to conduct (Yin, 2009), are not generalizable and contains a bias towards verification (Flyvbjerg, 2006).

Flyvbjerg (2006, p. 232) provides a strong defence for the validity of practice-based knowledge. He likens the importance of case studies to the production of "paradigmatics" and "exemplars" and that without exemplars, a discipline would lose its effectiveness because exemplars, like case studies, become the models of excellence that others follow. Based on the phenomenon to be investigated and the advantages that case study has in this context, case study is adopted as the research approach for this investigation. The problem of generalization could be resolved through either analytic generalization or transferability as against population generalization, which is obtained in surveys (Yin, 2009). With a robust research design, the case study would be as rigorous as other research approaches (Yin, 2009). To ensure reliability in case study, data collection protocol will be made available for any future investigators.

Also, to ensure construct validity, the sources of data will be triangulated (Fellows and Liu, 2008). Barrett and Barrett (2003, p. 759) refer to triangulation as a way of ensuring credibility in the "process of argument" in understanding the phenomenon. This resonates with the opinion of Remenyi *et al*. (2002) and Proverbs and Gameson (2008) that a case study is a story based on in-depth and multiple-triangulated sources of evidence with the intention of providing meaning to a real-life context. Punch (2006) and Yin (2009) advocate that research design must follow the research problems as stated in the aim and objectives or research questions and theoretical propositions. Yin (2009) describes the four types of case study designs as: single-case holistic design, single-case embedded design, multiple-case holistic design and multiple-case embedded designs.

Single-case designs are more appropriate where the investigator can have access to a critical case or an extreme case (Flyvbjerg, 2006). It can also be used where there is a representative case and where a pilot study or preliminary investigation is being carried out to firm up the subsequent large-scale study (Yin, 2009). Where there is absence of a critical, extreme or representative case, Yin (2009) opines that a multiple-case study is carried out instead. This may enable the demonstration of theoretical replication and enhance the validity of the study (Yin, 2009; Yin, 2012). A single case study is proposed as the research design for the pilot/exploratory study while a multiple case is proposed for the main study. The pilot/ exploratory study is a preliminary site-based study designed to essentially firm up the main study.

6.8 Research Techniques and Design

Research techniques are concerned with how relevant data are collected and processed for the formulation of meaning. Keraminiyage and Underwood (2013) categorize research techniques into two distinct parts: data collection techniques and data analysis techniques. For a case study approach, data collection techniques comprise questionnaires, interviews, document reviews and direct observation, while data analysis techniques comprise statistical analysis, content analysis and thematic analysis. Data is however defined as "the concrete details, the measures that are collected, gathered or produced when applying a method" (Keraminiyage and Underwood, 2013, p. 32). However, the research approach employed directly dictates the type and nature of research techniques applied. Data collection techniques and data analysis techniques for quantitative research methodology are mainly different from that of qualitative research methodology due to differences in philosophical inclination.

With case study as the research approach, the research design selected is as shown on Figure 6.3, which is divided into three different but overlapping sections. The first section is concerned with the identification, definition and design of the parameters for the network. As a practice-based research, this section commences with the identification and definition of a problem in practice. This problem happens to be the pressures of compressed timelines during the pre-contract documentation in QS firms in Nigeria. Cases were selected for the empirical studies as described in sub-section 6.9 and an appropriate data collection protocol was designed to guide the interview. This section concludes with the conduct of a pilot/exploratory study to firm up the design and determine the feasibility of the main study.

The second section comprises the collection of data at the case study firms and the individual analysis and writing of individual case report. The third section involves the analysis of cross cases and presentation of the final conclusion drawn from the cross-case analysis. Also included in the third section of the research design is a probable modification to the innovation model as a result of the evidence from the empirical studies and policy implications drawn from the conclusions. The instruments of data collection applied in this technique are semi-structured interviews, documents, archival records and direct observation.

With this technique it would be necessary to triangulate data (Fellows and Liu, 2008) by using the four data collection instruments of semi-structured interviews, documentation, archival records and direct observation. The unit of analysis is the QS firm and interviews are conducted with two staff of the unit of analysis firm including the principal partner. All interviews are digitally recorded to aid reliable transcription and a copy of the transcribed interview sent to the research participants for confirmation before subsequent analysis in order to aid content validity (Kagioglou *et al*., 2000).

Data analysis is by template analysis, a variation of thematic data analysis (King, 2012). The recorded interviews are transcribed and read thoroughly by the analyst for familiarization. Subsequently, themes are developed to address the aim and objectives of the study as a precondition for coding. For the exploratory work, initial coding is carried out by identifying texts in each interview transcript that resonate with any of the themes. A respective code is then attached to each identified text until the whole body of the transcripts are coded. Themes and codes are amended to take care of some parts of the transcripts that do not easily fall into any coding category. Due to the large amount of data generated during the main study, data analysis at this stage is done using NVivo 11 software. The final template is used to interpret and write individual case report. Finally, a cross-case analysis is carried out between the six multiple cases before producing the final report.

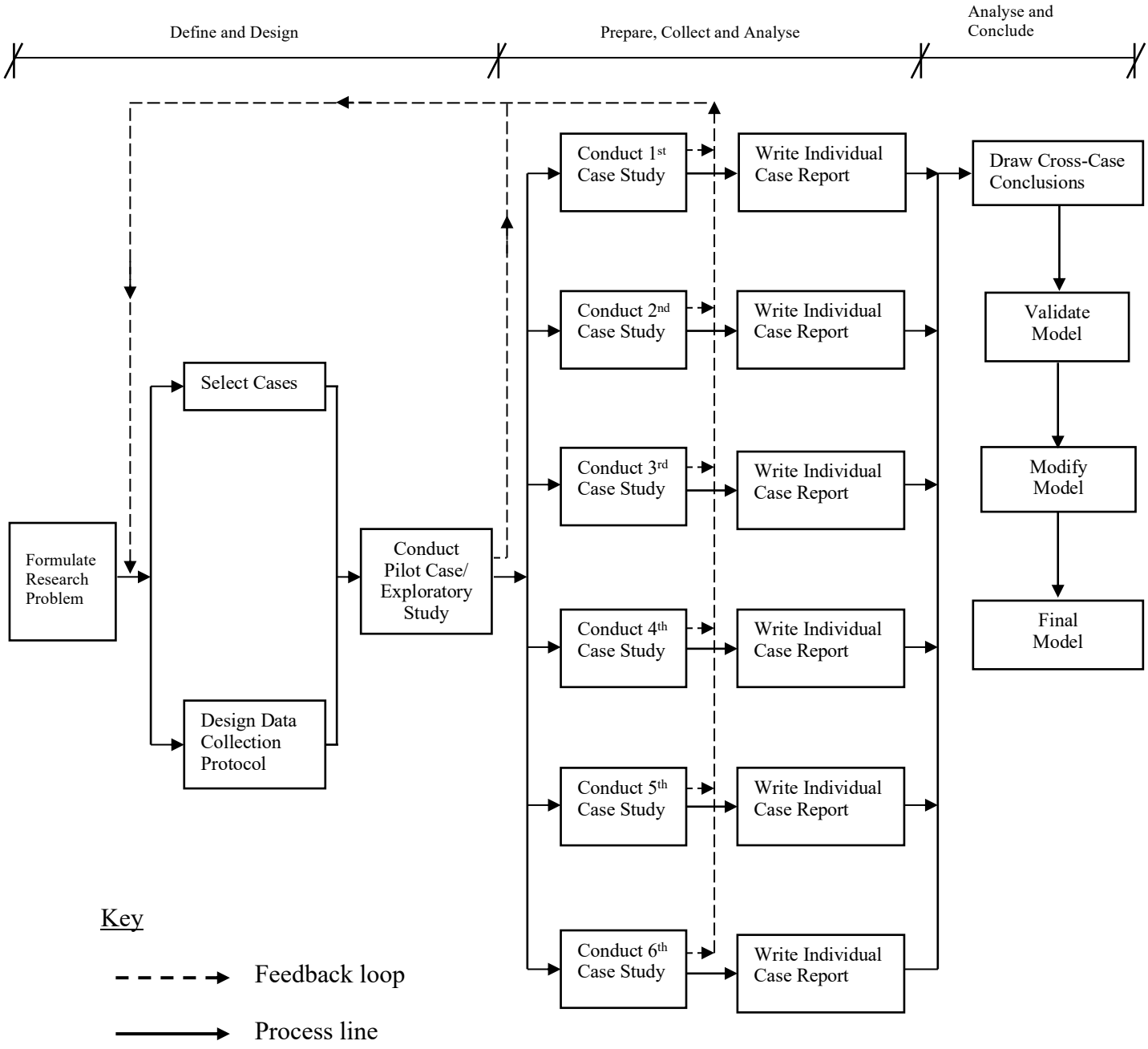


Figure 6.3: Research Design (Adapted from Yin, 2009)

6.9 Sampling

The population of this study is the number of registered QS firms in Nigeria, which as at November 2015 stood at 555 (NIQS, 2015). The creation of rich pictures through interviews, observations, records and documents, which cannot be obtained from any survey-centric technique, is very important to this investigation. Also, since not every member of the population would be able to provide rich pictures because not all of them may have experience in innovation particularly during pre-contract documentation, the principle of random selection will not be applicable in this study. Therefore, the sampling method applicable to the study is not statistical but snowball and convenience based on the following criteria:

6.9.1 Practical Constraints

The firms should be ready to submit to interviews and visitations within the timeframe of January 2017 to December 2017 within when data were collected for the main study. They should also be firms that are open and accommodating in their views on research and that are not likely to consider the investigation/study as an erosion of their competitive edge.

6.9.2 Experience

The firms should be known to have had some experiences in innovation and selected using a combination of *snowball* and *convenience* techniques (Fellows and Liu, 2008). The list of QS firms known to be innovative would be compiled using the following parameters:

1. Published works in innovation;
2. Invitation by the Nigerian Institute of Quantity Surveyors (NIQS) or Quantity Surveyors Registration Board of Nigeria (QSRBN) to present papers on any recognised theme in innovation;
3. Mentioning of firm's name in the professional or trade journals for any recognised theme in innovation.

In the final analysis the names of 15 firms out of 555 became very prominent as those most noticed as innovative. Out of a total of 15 firms selected through this process, only 8 were very willing to be research participants. Six firms were finally selected as research participants based on feasibility and the relevance of their experience in innovation at pre-contract practice.

6.9.3 Convenience, Safety and Accessibility

Nigeria is divided into six geopolitical zones hence participant firms were to be selected such that each geopolitical zone is represented. However, insurgency became a handicap and necessitates the application of *convenience* technique. The final selection were three firms from northern Nigeria and three firms from southern Nigeria. Appendix E shows a brief profile of each of the six firms in the classification assignments for firms. The firms were selected from the key areas of the south-west, north-west and north-central geopolitical zones where we have the bulk of the registered QS firms. No participant was selected from the south-south and north-east geopolitical zones where there is insurgency and terrorist activities of *Boko Haram* and *Avengers*. These zones were considered unsafe and not accessible for this research purpose.

6.10 Ethical Compliance Process

The ethical approval process for this study complied fully with the ethical approval process and research governance of the University of Salford at the time of application for ethical approval. The application for ethical approval was granted vide the letter shown in Appendix F (p. 302) from the Research Ethics Panel after submitting relevant documents. This study has both taught and research components hence, the applications for ethical approval were made twice: towards the completion of the taught element and also before the commencement of the main field work. Ethical approvals were granted at both points. Risk assessment was not required because the research does not involve the use of ionising or other types of radiation, hazardous substances or risk of injury to the participants.

To seek informed consent, invitation letters (see Appendix F) were sent to fifteen identified firms asking for the consent of the respective firm for two of their staff to be invited for interviews. After the firms' consents were obtained, individual letters were subsequently sent to the respective participants within the firm. Attached to the letter of invitation for both the firms and the individuals were the *participant information sheet* and the *participant consent form* (see Appendix F). The participant information sheet provided answers to relevant ethical issues relating to consent, right to withdraw from the study at any time, security and confidentiality of data and, where participant could ask for further information should they require it. Participant consent form was completed, signed by the

respondents and sent back to the researcher. It was to either confirm or decline consent as a participant. Participant consent forms from eight out of fifteen firms were received before the field work commenced but six firms were finally selected as respondents due to feasibility and convenience as explained in section 6.9.3 above.

The semi-structured interviews were tape-recorded and the interviews were consistent across cases in applying the case study protocol and interview template (see Appendices B, C and D, pp. 294, 296 and 298). After transcription of the interview, a copy of the transcription was sent to individual respondent for validation, that the transcripts represented what took place during the interview. Before the analysis of data, all the respondents verbally confirmed the transcripts as representing what transpired during the interview. The unit of analysis of data is the firm even though data were provided by the staff of the firm. Data for the study were collected from interviews, documents provided by the firm and, direct observation by the investigator.

6.11 Data Collection and Analysis Process

Data collection is from three instruments: semi-structured interview, document and personal observation. Following the recommendation of Miles and Huberman (1994), the basic form of representing and processing data for this research is in *Words.* Such *Words,* which are the outcome of interviews, documents and observation have been processed, refined, reduced, simplified and presented in a way that is clear to the reader. Interviews conducted with two staff of each respondent firm were transcribed and validated appropriately by the respondents. Documents received were analysed in context and all observations that were noted in memos during site visits have been properly documented in *words*.

All the data arising from the three instruments have been coded along the themes developed for the investigation. The coding for the exploratory case was done manually along the themes presented in Table 8.8 (p. 142) and as represented on the morphology of themes (p. 141). The summaries of the thematic coding for the exploratory case are as shown on Tables 8.9-8.11 (pp. 143-145)

The coding in the main case studies for Firms A-F (Chapter 9) were done thematically using NVivo 11 facilities along the refined themes shown on Table 9.1 (p. 167). The

themes (nodes) and the coding references for the firms are shown in Appendix E (p. 301) . The summary of the coding of all data from the three sources (interview, document and observation) are displayed in the following matrices, which made it easy for the analyst to draw conclusions (Miles and Huberman, 1994) that incorporate all the three sources of data:

a) Table 9.2: Thematic Matrix of Data Sources for Firm A (p. 183)
b) Table 9.3: Thematic Matrix of Data Sources for Firm B (p. 199)
c) Table 9.4: Thematic Matrix of Data Sources for Firm C (p. 210)
d) Table 9.5: Thematic Matrix of Data Sources for Firm D (p. 220)
e) Table 9.6: Thematic Matrix of Data Sources for Firm E (p. 235)
f) Table 9.7: Thematic Matrix of Data Sources for Firm F (p. 250)

The analyst summary of each of the six matrices above are extracted and brought into the cross-case matrix to provide the platform for cross-case analysis where the similarities and differences between the six respondent firms are compared and contrasted before the final report is written. The final position is shown on Table 10.1: Thematic Matrix of Cross-Case (p. 255).

6.12 Summary

The chapter identified the nature of the research problem, the research tradition within the respective discipline and the philosophical orientation of the researcher as the three issues that determine the research methodology. The nature of the research problem is considered through the concepts of habitat and morphology. It concludes that the habitat of the research problem is the internal and external environment and the interaction of all its components within a practice-based research setting in the built environment. Morphology, being the structure of the problem, determines the complexity of the research problem and consequently the ability to formulate it effectively. It found out that problem delimitation, examination of relevant changes, breaking down of complex problem into manageable sub-problems and focusing on controllable components would assist in reducing the complexity of the research problem and making its formulation and resolution feasible.

The philosophical orientation of the research was considered along the quantitative-qualitative continuum and by using the nested model, it proposed a research philosophy of idealism, interpretivism and value-laden. The consideration of the various research

approaches narrowed down to qualitative approaches and recommends case study as the most appropriate research method amongst the qualitative approaches. After submitting relevant documentation, ethical approval for the research was granted by the University of Salford. Six cases were selected through a snowball and convenience sampling system. Informed consents were obtained from the respondents and data generated from interviews were confirmed by the respective respondents before analysis. To ensure triangulation of data, three instruments of data collection including interviews, documentation and direct observation were employed. For analysing the data, template analysis, a variation of thematic data analysis was used. Due to the large amount of data generated from the six case studies, NVivo software was used as the computer aided qualitative data analysis software.

CHAPTER SEVEN

7.0 RESEARCH METHODOLOGY: THEORETICAL MODEL FOR PRACTICE-BASED BUILT ENVIRONMENT RESEARCH

7.1 Introduction

While Chapter 6 deals with the fundamentals for selecting a research methodology, there appears to be a chasm between the views of academic research purists and practice-based researchers, particularly in the built environment, about the nature of research methodology adopted in practice-based setting. Academic and practice-based researchers appear to think about and see research differently. For instance, Barrett and Barrett (2003) argue that there is need for a better understanding and synergy in how research can impact on practice and vice-versa as the present situation in the construction industry is akin to research and practice operating more in individual silos due to cultural differences. A claim by Lennon and Whitford (1994, p. 2) that, "genuine knowledge does not reflect the subject who produced it" appears to be diametrically at variance with that of Winter *et al.* (2000, p. 28) that, "practice-based knowledge is an obvious example of a claim to knowledge which is context-bound, and in which the subjectivity of the producer of the knowledge cannot be eliminated". Both statements paint a graphical picture of the inherent contradictions between the views of the academic and practice-based researchers.

Nevertheless, this gulf may not be unconnected with the differences and the need for reconciliation between tacit knowing and explicit externalisation of knowledge, which could and in fact may have resulted in the academe doubting the rigour of the process of practice-based research and the acceptability of its deliverable as valid knowledge. The declaration of Barrett *et al.* (2008, p. 79) that "tacit knowledge is hard to formalise, making it difficult to communicate or share with others" is a confirmation of the need to develop means of externalising tacit knowledge (Mann, 1998) because of the nature of tacit knowledge in embodying "intangible factors embedded in personal beliefs, experiences and values (Barrett *et al.* 2008, p. 79).

Archer (1995, p. 11) opines that, "all studies about practice, if they are to be recognised as research studies, must employ the methods, and accord with the principles of the class to which they belong". Hence, in arguing for a different and valid methodology for practice-

based research, Nelson (2013, p. 48), although coming from the position of the arts, submits that, “it is no longer tenable to take the methodologies of the sciences as the gold standard of knowledge instead, we find ourselves in a situation in which different approaches to knowing have different criteria for what is to count as true or valid”. There is therefore the need to address the concerns of the academe through a theoretical model that encapsulates the key concepts of practice-based research and an argument for the validity of its process. This practice-based research model may not only conceptualise the methodology of practice-based research but also assist in the analysis, interpretation and understanding of data from built environment practice-based investigations. This is done in this chapter through the lens of the professional doctorate in built environment (DBEnv) degree process.

Having identified and grounded the problem in practice in the previous chapters, this chapter therefore proposes a theoretical model that guides not only the investigation and understanding of a practice-based phenomenon but the acquisition of the DBEnv. This is important due to the uniqueness of the professional doctorate and the need to contrast its practice-based process of knowledge creation with that of a theoretical and conventional PhD. Agreeing with the position of Archer (1995) and providing the platform for Nelson (2013), Winter *et al* (2000) describe the process of producing and judging practice-based doctorates as a problematic one because of its difference with academic doctorates. The essence of the arguments of this chapter is therefore to show that the process of the DBEnv, although different from the PhD, is as rigorous and knowledge generated from practice through this process qualifies as valid knowledge.

In other words, the chapter argues for what practice-based research in the built environment is, and how its process meets the requirements of higher education research qualifications. The chapter deals with this by reviewing the disciplinary models to determine the extent to which the built environment meets the disciplinary taxonomy. Knowledge in its different approaches is equally considered to present clearer classifications for discussion. It also discusses knowledge generation in practice-led research and how this meets the requirements of the United Kingdom Framework for Higher Education Qualifications in the award of a doctorate of built environment. In summary, it discusses some relevant theories and concepts, which provide justifications for tacit knowing being externalised as valid knowledge and finally proposes a model on how

this is done in DBEnv and offers that the model can be applied to any other professional doctorate.

7.2 Built Environment Disciplines

7.2.1 Discipline and Interdiscipline

A profile of recent scientific debates is replete with the terms "discipline" and "interdiscipline" as these, particularly the latter, seem to indicate the direction in which future research is inclining to follow (Tait & Lyall, 2001; Foster, 2003; Krishnam, 2009). These recent debates are of course offshoots of the methodological debates of the 1990s (Seymour & Rooke, 1995; Seymour *et al.*, 1997; Runeson, 1997; Raftery *et al.*, 1997) in which most of the issues raised and arguments proffered remain unsettled due to the heterogeneous nature of methods and the inability to build common position. However, recent contribution by Dainty (2008) has suggested methodological pluralism.

A discipline is generally seen as a field or area of study. Krishnan (2009) sees discipline as a technical terminology that allows learning to be organized in a particular way. There are many disciplinary models like the Lodahl and Gordon (1972) model which seeks to measure the variations in different academic disciplines. However according to Chynoweth (2009), the Biglan Disciplinary Model shown in Figure 7.1 (Biglan, 1973) is the most popular of the models, based on its references by researchers. It is equally very relevant to the context of this chapter. This model charts academic disciplines within the four quadrants of a graph whereby the X-axis moves horizontally from *hard* to *soft* and the Y-axis moves vertically from *Applied* to *Pure*. Figure 7.1 shows the location of the respective disciplines within the 4 quadrants of *social and creative professions*, *arts and humanities*, *natural sciences* and *applied sciences.* Unfortunately, though, Figure 7.1 has no built environment discipline on its matrix and that calls to question the notion of seeing the built environment as a discipline. Perhaps this informs Chynoweth (2009) to infer that the built environment, after all, may not be seen as a discipline but rather as an interdiscipline.

A key problem of the concept of discipline and its insularity from other disciplines is the difficulty of encouraging different disciplines to work together effectively so that they can be leveraged by individual disciplinary competencies. Too much disciplinary insularity appears to be an impediment. Perhaps that is why Krishnan (2009) argues that the

partitioning of academic engagements into artificial boundaries may be preventing researchers from seeing complimentary good in other areas. This could bring insularity and prevents the exchange of ideas among respective researchers according to Snow (1959).

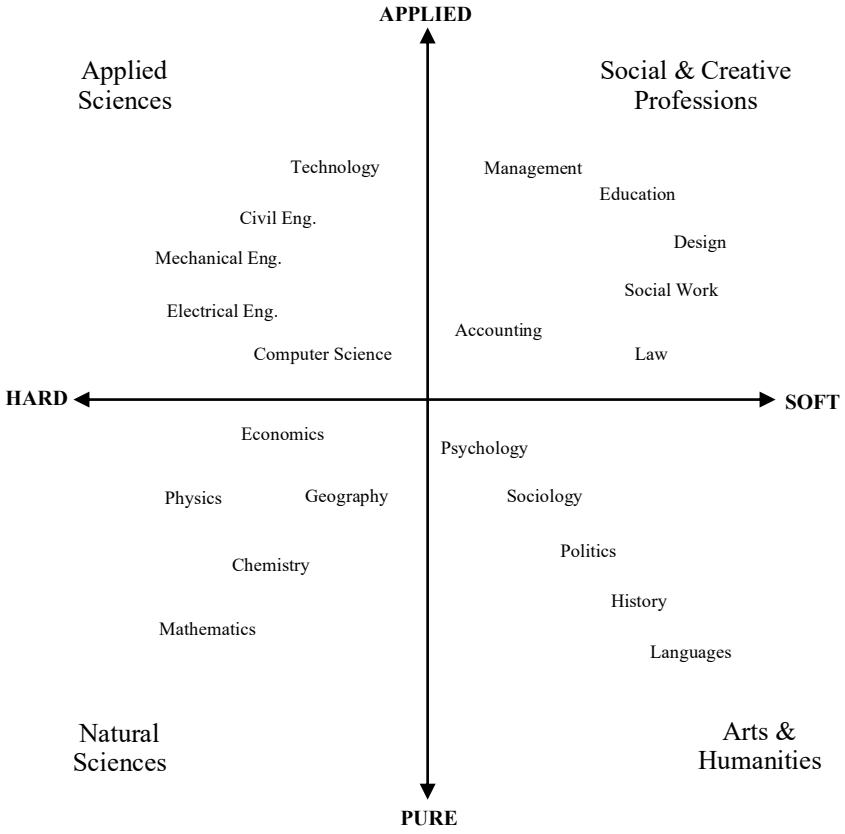


Figure 7.1: Biglan Disciplinary Model (Chynoweth, 2009)

Similar to the problem of defining discipline is that of defining interdiscipline. Moran (2006) sees interdisciplinary as a contradictory and confusing term but agrees that it is meant to address all the problems of those who oppose the concept of disciplinarity. Along the same thought however, Moran (2002) views interdisciplinarity as the engagement with problems that reside outside the purview of disciplinarity or that is difficult to be resolved by the different individual discipline. Due to the longstanding academic culture of insularity and compartmentalization (Snow, 1959), it has been very difficult therefore to implement the concept of interdisciplinary in an institutional setting (Klein, 1990). However, current trends seem to have taken a different attitude probably because funds for research are increasingly being tied to collaboration between disciplines and also, due to the nature of innovative research links with industry (Tait & Lyall, 2001; Foster, 2003; Krishnam, 2009). Jantsch (1972) provides five steps (classifications) towards achieving cooperation and coordination in education and innovation system. This gives a reliable

measure of the many shades of disciplinarity and a foundation for understanding the built environment interdisciplinary in what Jantsch (1980, p. 305) also refers to as a "hierarchy on notions". Of the five steps, Figure 7.2 shows the four steps that are relevant to built environment interdisciplinary as classified by Jantsch (1972) and Chynoweth (2009): *multidisciplinarity*, *pluridisciplinarity*, *crossdisciplinarity* and *interdisciplinarity.*

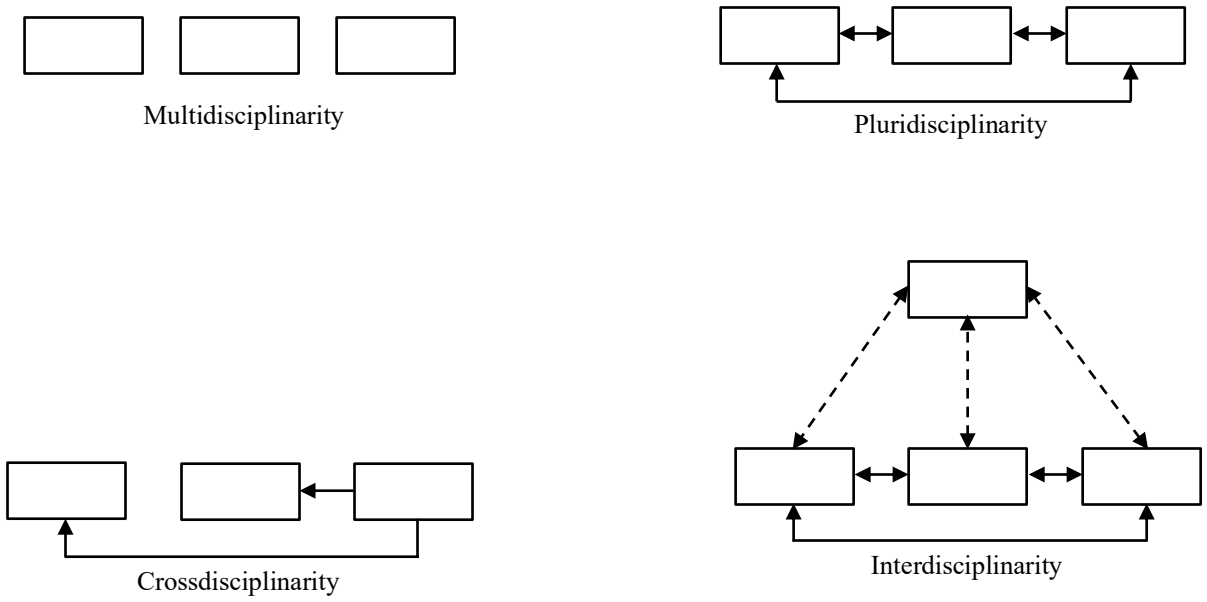


Figure 7:2 Jantsch Taxonomy of Interdisciplinarity (Jantsch, 1972; Chynoweth, 2009)

The first classification, *multidisciplinarity*, indicates each discipline working independently of the other with no formal link or relationship to make them work together as an integrated whole. Jantsch (1972, p. 107) describes it as, "one-level multi-goal; no cooperation". As Klein (1990) and Chynoweth (2009, p. 7) opine, any collaboration between them is an "accident rather than design". The second classification, *pluridisciplinarity,* has some measure of linkage or relationship amongst the various disciplines but this relationship is not coordinated and still happens as a matter of accident rather than choice as in the previous classification. Jantsch (1972, p. 107) describes it as, "one-level multi-goal; cooperation but no coordination" *Crossdisciplinarity* is the third classification and it is the first to have some closeness to coordination. Jantsch (1972, p. 107) describes it as, "one-level one-goal; rigid control from one disciplinary goal". Chynoweth (2009) opines that the presence of a dominant discipline forcing its will on the other disciplines in the classification prevents it from achieving a seamless integration.

Lastly is *interdisciplinary* which presents a model of two-level hierarchical operations in which all the various disciplines are working together as an integrated whole. Jantsch (1972, p. 107) describes it as, "two-level multi-goal; coordination from higher level". This is made possible when each and every discipline submits a measure of its unique characteristics and objectives to the controlling characteristics and objectives of the interdisciplinary. In the words of Chynoweth (2009, p. 7) such characteristics are referred to as "disciplinary concepts and goals" or "axiomatics" according to Jantsch (1972). However, and as it happens in some cases, if some disciplines within the interdisciplinary are privileged to getting more attention than the others in the allocation of say, research funds, this could affect and work against the harmonious relationship in the interdisciplinary (Elzinga, 1985; Brandon, 2002; Chynoweth, 2005).

While the built environment could not be classified as a discipline within the context of available disciplinary models, it however possesses the characteristics, and of course the potentials, of being classified as an interdisciplinary. The next section will examine this proposition within the context of current practice.

7.2.2 Built Environment as an Interdisciplinary

The Transportation Research Board of National Academy of Sciences, TRB (2005, p. xiii) defines the built environment as an amalgam of three of the basic areas of interactions between man and the natural environment: "*land use patterns, transportation systems* and *design features*". While land use patterns refer to the distribution of human activities within a given area and transportation systems refer to the physical infrastructure that enable linkages and connections between land use patterns, design features are described as the "aesthetic, physical and functional qualities" within the built environment (TRB, 2005, p. xiii). Chynoweth (2009) recognises the built environment as, "an applied but theoretically coherent interdisciplinary with a common epistemological axiomatic". The built environment could also be seen as encompassing the design, development and management of spaces and physical infrastructure (Griffiths, 2004).

With the linkages between these different sub-divisions, it is therefore not surprising that many UK universities have designed courses that attend to these heterogeneous activities and have christened it the built environment disciplines. These disciplines ranging from business related fields like property development, design related fields like architecture,

public policy related fields like planning, economics related fields like QS, and technology related fields like construction are forming a critical sector of the university faculties (Griffiths, 2004). After a synthesis of the various viewpoints of the knowledge areas of the built environment, Chynoweth (2009) submits that the following are the key areas of knowledge of the built environment:

1. Management
2. Economics
3. Law
4. Technology
5. Design

A profile of a course like QS is therefore most likely to have picked up some parts of Management, Economics, Law and Technology while Architecture might have combined parts of Management, Law, Technology and Design.

Adapting the Biglan disciplinary model to the built environment therefore, Chynoweth (2009) clearly traces out the built environment interdiscipline on the disciplinary model where the key knowledge areas of Management, Economics, Law, Technology and Design could be found as shown in Figure 7.3. The marked space defined by rectangle ABCD could therefore be referred to as the built environment space. It is curious however to note that the built environment space or the "built environment knowledge base" (Chynoweth, 2009, p. 6) as represented by rectangle ABCD is highly skewed towards both the applied sector on the vertical axis and the soft sector on the horizontal axis of the matrix. All things being equal, this appears to give clearer indications of future research engagements and processes amenable to the built environment.

Following the interdisciplinary model of Jantsch (1972) and using the key areas of knowledge identified in the built environment, Chynoweth (2009) presents the built environment interdisciplinary as shown in Figure 7.4. In this model, the key built environment knowledge base of Management, Economics, Law, Technology and Design are inserted into the interdisciplinary framework under the coordination of the *built environment axiomatic*. In this state, it is assumed that individual disciplines or knowledge areas are working together cooperatively, surrendering their individual goals to the collective built environment goal.

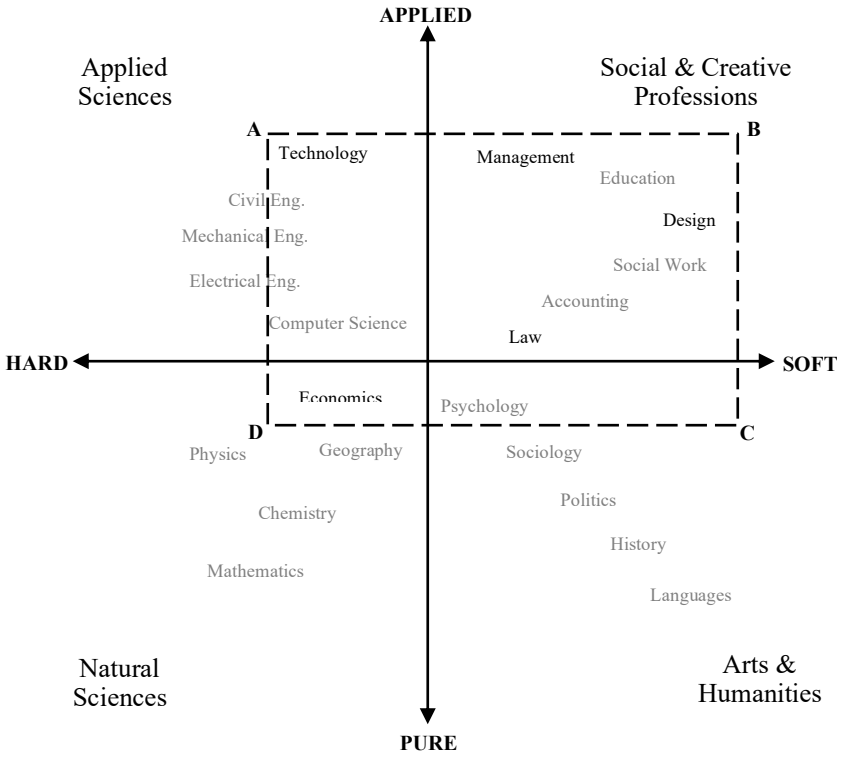


Figure 7.3: Built Environment Knowledge Base (Biglan, 1973; Chynoweth, 2009)

However, it is doubtful if this utopian state, of the built environment knowledge areas submitting their individual goals to the built environment axiomatic, has been reached in the built environment. The need for such a state to be "capable of delivering solutions to all stakeholders" (Chynoweth, 2009) and "sharing a common journey" (Brandon 2002) are issues which appear to be farfetched due to the unique problems of interdisciplinary; prime of which Elzinga (1985) refers to as, "epistemic drift" whereby some stakeholders or disciplines get more funding or recognition at the expense of others. An example is where management research gets more funding than technology, law and design due to the priorities set by the industries who fund such research engagements. In this scenario, *Management* as a knowledge area or discipline is more likely to have more influence over other knowledge areas within the built environment interdisciplinary and may, more likely than not, have a domineering capacity in fashioning out the mode and outcome of the *built environment axiomatic*.

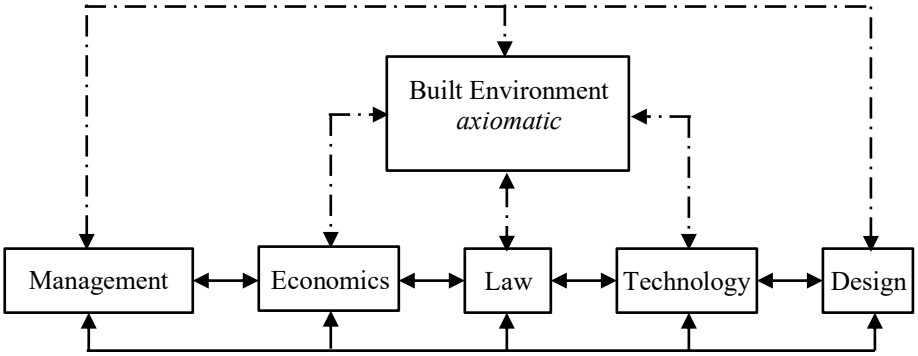


Figure 7.4: Built Environment Interdiscipline (Chynoweth, 2009)

7.3 Epistemology and Knowledge Production

7.3.1 Historical and Current Approaches to Knowledge

Etymologically, it is a general knowledge that epistemology originates from two Greek words, *Episteme* which means knowledge and *Logos* which means study, discourse or reasoning. As a branch of philosophy therefore, it is seen as the critical reasoning aimed towards the investigation and understanding of knowledge. Knight and Turnbull (2008) point to the critical importance of the status of knowledge to any academic researcher and the need for any research, be it academic or applied, to be properly situated within a particular epistemological foundation.

While Lennon and Whitford (1994, p. 2) opine that, "genuine knowledge does not reflect the subject who produced it", Winter *et al.* (2000, p. 28) counter by espousing that, "a claim to practice-based knowledge is an obvious example of a claim to knowledge which is context-bound, and in which the subjectivity of the producer of the knowledge cannot be eliminated". Philosophy defines knowledge as "justified true belief" (Knight & Turnbull, 2008) and this has been the guiding light right from the time of Socrates and his disciple, Plato in ancient Greece. However, right from the Ancient Greeks to date, various philosophical thoughts have emerged in how knowledge is produced and acquired and this could explain the plethora of schools of thought on knowledge production (Knight & Turnbull, 2008). In classical epistemology, Plato proposes the unity of all knowledge, which is warehoused in a single repository: philosophy. Aristotle later divided knowledge into theoretical and practical enquiry (Klein, 1990; Kishnam, 2009).

Classical epistemology sees philosophy as the parent of all studies and knowledge, giving birth to other studies and knowledge chambers at different points in time and is ever pregnant and ready to give birth again. Being the parent discipline and knowledge repository could have accounted for a doctorate of philosophy (PhD) being awarded in its name as the highest academic and research qualification that can be awarded in any subject area (Chynoweth 2009). Other equivalent qualifications that have however developed of recent are Professional Doctorates like DBEnv, EngD and EdD with the first professional doctorate being awarded at University of Harvard, USA in 1921 and in the UK in 1992 by the University of Bristol (Drake & Heath, 2011).

Of note however, is another view that presents the claim that the origin of philosophy and its expressions could not have been Ancient Greece but Africa. Onyewuenyi (1987) points to the records that the Ionian philosophers like Pythagoras and Tales visited Africa, notably ancient Egypt, to be educated in all disciplines of knowledge by African Philosophers and this might have informed their theses on knowledge. With the paucity of historical documentation, it may therefore be difficult to pursue this line of thought.

Though Aristotle was one of the ancient Greek philosophers, his concepts of theoretical and practical enquiry have therefore formed the basis of modern epistemology of rationalism, as the foundation for mathematics; and empiricism, as the foundation for natural sciences (Knight & Turnbull, 2008). Rationalism is concerned with knowledge acquisition from rational thought as expressed through mathematics particularly geometry. Empiricism on the other hand is concerned with knowledge acquisition through experience in the form of an experiment as is done in astronomy, physical, chemical and biological sciences. Of course, one can quickly add practice knowledge espoused through case studies as Yin (2009) opines that case study could be likened to an experiment.

To a rationalist therefore, knowledge can be acquired *a priori* i.e. without going to the field to perform any experiment as reason alone can provide us with knowledge. This is the substance of the knowledge to be generated in this chapter whereby a theoretical model is proposed *a priori*. On the other hand however, the carrying out of experiment is a cogent requirement for the empiricist in the acquisition of *a posteriori* knowledge (Knight & Turnbull, 2008). This is also the substance of the knowledge to be generated in the

subsequent chapters whereby case studies (experiments) are conducted to generate knowledge *a posteriori*.

7.3.2 Academic and Applied Knowledge

Knowledge has also been classified as academic or applied. Academic knowledge production takes place in the academy where a structured approach has been established in carrying out research with the intention of producing new knowledge or advancing existing knowledge without necessarily linking it to industrial application. This is producing knowledge for knowledge sake and not for its application to problem solving. Many universities and research institutes are at the forefront of this where candidates are supervised not only to create or advance knowledge but also to obtain a doctoral qualification.

Applied knowledge on the other hand could be referred to as knowledge produced in practice. Polanyi (1966) classifies the approach to producing this type of knowledge as the tacit dimension. With the growing dissatisfaction with the relevance of academic knowledge to industrial processes and organizations, more attention has of recent been placed on practitioner research. It is not surprising therefore that the academic communities take little notice of knowledge created in the workplace and perhaps this encourages Eraut (1994) to opine that informal learning in a formal setting is under-researched.

Engestrom (1996) describes how knowledge is created in industrial and economic productivity through activity theory. Activity theory indicates that new knowledge is created through the interaction of a practitioner with his or her professional practices (Drake & Heath, 2011). This interaction enables expansive learning (Engestrom, 2001) to occur at the workplace through the engagement of problem-solving practices. The social interactions at the workplace between the practices, researcher and the supervisor create a dialogue between and within the actors (Drake & Heath, 2011) that Gutierrez *et al.* (1999) refer to as the third space. This could also be likened to what Vygotsky (1978) calls mediation, a stimulus for learning during the social interaction between the workplace, researcher and supervisor (Drake & Heath, 2011). Foray (2006) opines that knowledge is generated from any production or use of a good or service not because knowledge

production is necessarily the goal but because of the activity or social interaction inherent in the process.

Built environment practitioners could therefore be seen to be generating knowledge through a rigorous process of engaging in deep professional activities and through social engagements in the workplace. Foray (2006, p. 8) concludes that activity can, "generate learning and hence knowledge production". Much of this knowledge that is often displayed as *professional craftsmanship* (Mills, 1959) is tacit in nature. Polanyi (1966) opines that we know more than we can express so, a craftsman (a built environment practitioner) knows more than he/she can tell. The practitioner researcher's challenge is to bring out this tacit knowledge and make it explicit in what Mann (1998, p. viii) calls "externalize tacit knowing". Various models like the experiential learning model (Kolb, 1976; Nonaka and Takeuchi, 2005) are available as frameworks for bringing out tacit knowledge as will be discussed subsequently.

7.4 Doctoral Level Research in the Built Environment

7.4.1 The Framework for Higher Education Qualifications

Externalising the tacit knowing appears to be a major way through which what is known could be subjected to peer review mechanism and subsequently admitted as knowledge. In research at doctoral level in the built environment, such knowledge needs to be considered along the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (QAA, 2008) key requirements for level 8 awards. Doctoral degrees are awarded to those candidates who have satisfied the four basic requirements of the Framework for Higher Education Qualifications at level 8.

In the first requirement, candidate must demonstrate having undergone a training resulting into a systematic acquisition and understanding of existing knowledge within the built environment discipline or practice. The issue of what constitutes an academic discipline as discussed in the previous sections comes to focus here and worth referring to. In previous discussion it was pointed out and argued that the built environment, due to the heterogeneous nature of its structure, could not be referred to as an academic discipline but an academic interdisciplinary (Jantsch, 1972; Chynoweth, 2009). Chynoweth (2008, 2009) adapting the Biglan (1973) model, further identifies some five knowledge areas in the built

environment, that is; Design, Technology, Management, Law and, Economics that are supposed to constitute the key knowledge areas of the built environment interdisciplinary.

It therefore means that to fulfil the first requirement for the award of a Doctorate of Built Environment (DBEnv), the candidate might have systematically acquired and understood the body of knowledge in the stated five knowledge areas of Design, Technology, Management, Law and, Economics as it relates to the built environment. This could prove to be very challenging considering the vastness of each of the five areas. Perhaps it is in recognition of this problem that SoBE created optional doctorates in construction management and real estate (DConsMgt, DRealEst) which, though operates within the built environment interdisciplinary, relates to a specific and manageable area of research and knowledge. The design of the DBEnv therefore incorporates a taught element in its first two years thereby providing a platform for undertaking the required training resulting into a systematic acquisition and understanding of existing knowledge within the built environment discipline or practice.

For the second requirement for the award of a doctorate of the built environment, the candidate must have a detailed understanding of the research methods and techniques applicable in the built environment interdisciplinary. There is a plethora of research methods and techniques within the built environment interdisciplinary which could be broadly classified into three basic categories of Quantitative, Qualitative and Mixed methods. The methodological debates of the mid 1990s provide a history of debates on the merits and demerits of the different methods (Seymour & Rooke, 1995; Seymour *et al.*, 1997; Runeson, 1997; Raftery *et al.*, 1997).

Dainty (2008), having analysed the types of research methods used by researchers in construction management for all the research published in Vol. 24 of the *Construction Management and Economics* in which 71% was quantitative, while about 8% and 11 % were qualitative and mixed method respectively, laments the dominance of a single paradigm in research methods in construction management. Dainty states the dangers of relying exclusively on research approaches that are based on a single paradigm and then argues for "methodological pluralism" to ensure robust research in construction management. Fellows (2010, p. 11) summarises the journey so far in paradigm shift in construction management and built environment and, while advocating for a "rigorous use

of methodological pluralism", agrees that the future has ample accommodation for "stochastic perspectives" and the consideration of complexity in future methods.

In agreement with Dainty (2008), although within the context of sociology, Denzin (2009, p. 13) opines that:

> If each method leads to different features of empirical reality, then no single method can ever completely capture all the relevant features of that reality; consequently, sociologists must learn to employ multiple methods in the analysis of the same empirical events".

His view was also anchored on that of Mills (1959) who proposes the concept of *sociological imagination* as, "the capacity to shift from one perspective to another, and in the process to build up an adequate view of a total society and its components" (Denzin, 2009, p. 5). Doctoral researchers in the built environment therefore need to have a detailed understanding of quantitative, qualitative and mixed methods and approaches to research in the built environment. In doing this they will be better positioned to appraise each and every method and utilise whichever method is relevant to engaging the phenomenon at hand. This requirement appears to be met by the taught element of the doctorate in built environment.

The third requirement for the award of a doctorate in built environment is the general ability to conceptualise, design and implement a research project for the generation of new knowledge and the ability to change such research concept and design as situation demands. While the first two requirements above deal with the necessary preparations and trainings prior to undertaking a doctoral research engagement, the third requirement is concerned with the actual process of carrying out the research. The conceptualisation and design of research requires adequate cognitive power because research is becoming very elitist and seductive in nature as it conveys the use of considered and thoughtful intelligence in the recognition and analysis of problems and seeking ways of moving to engaging phenomena (Drake & Heath, 2011) and consequently creating new knowledge or advancing existing ones. Doing this requires a whole lot of hard toolkits (Lee, 2009) and most importantly the soft skills of personal management, project management, time management, commitment and inquisitiveness. Both the taught element and the process of the doctorate in built environment appear to meet this requirement.

The final requirement for the award of a doctorate in built environment according to QAA (2008) is the creation of new knowledge or the advancement of existing knowledge through original research or advanced scholarship of a quality that has met peer review standard and that merits publication. In summary, QAA (2008) sees the creation of new knowledge as the end of the process and also as a product of the process. However, Drake & Heath (2011) propose a radical view of the creation of new knowledge and opine that research do engage with new knowledge at every stage of conceptualizing, designing and implementing research. This means that new knowledge has therefore been a part of the process at every point in time. Similarly, in their seminal text, Phillips and Pugh (2010) extend the work of Francis (1976) and identify fifteen potential ways in which a doctoral student can make a valid contribution to knowledge that is worthy of a doctorate. Neither Philips and Pugh (2010) nor Drake & Heath (2011) however indicate whether the new knowledge created at every stage of the process could merit publication or not. It could then be argued that the new knowledge proposed by QAA should be quantified or validated through peer review mechanism and through publication or more realistically determined by the examiners during the *viva voce*. The DBEnv process also incorporates these requirements.

7.5 The Concept of Psychological Contract

In dealing with the problems of recruiting staff by organisations and the high level of labour turnover, Kotter (1973) proposes a solution through the concept of psychological contract, which seeks to harmonise implicit or tacit understanding of the expectations of both parties. This ensures that the expectations of the employee are in line with that of the employer. This concept can be borrowed from human resource management for application in the relationship between the university and the doctoral researcher. Rousseau (1989) defines psychological contract as, "an individual's belief regarding the terms and conditions of a reciprocal exchange agreement between the focal person and another party." Robinson and Rousseau (1994) opine that:

> A psychological contract emerges when one party believes that a promise of future return had been made (e.g. pay for performance), a contribution has been given (e.g. some form of exchange) and thus, an obligation has been created to provide future benefits.

Kotter (1973) offers a simpler definition for psychological contract as "an implicit contract between an individual and his organisation which specifies what each expects to give and

receive from each other in their relationship". This means that psychological contract is a non-binding agreement in the minds of parties but which plays a significant role in the successful execution of the formal contract.

Although the concept was used to understand the behaviour of employees within organisations, it is however being applied here to understand the behaviour of practice-based doctoral research candidates within the university system. There is an existing formal contract between the university and the research candidate; but more than the formal contract, the understanding of the informal/implicit contract by the candidate and the university is more critical in determining the success of that relationship or the successful execution of a research and the award of a doctorate. This understanding relies significantly on harmonising the deep-seated implicit or hidden assumptions of one party with the other.

Central to the concept of psychological contract is the matching process, which enables a compromise to be reached between these two and sometimes opposing implicit assumptions of both parties. For instance, the implicit assumptions of the research candidate may include the following:

1. Get a doctorate
2. Produce ground-breaking research
3. Be noticed worldwide
4. Prove that I can do it
5. Supervised by the best in the field
6. Publish in peer reviewed journals

Also, the implicit assumptions of the university could include the following:

1. Produce more doctorates
2. Get more research fund
3. Be recognised worldwide
4. Produce more researchers and experts in the field

These assumptions from both parties would need to be matched so that a compromise could be reached in conflicting areas. The matching process could be achieved through an open and frank discussion between the research candidate and the supervisor (representing the university). It is also expected that the concept of reciprocal trading will be a willing

instrument in the hand of the parties. Reciprocal trading, a term borrowed from marketing, ensures that a party patronises the other party with the understanding that the other party will subsequently patronise the first party. According to Austin (1966, p. 166) speaking on reciprocal trading arrangement, "the essence of the arrangement is the willingness of each company to buy from the other conditioned upon the expectation that the other will make reciprocal purchases". However, in the context of the application here, it is not about purchases but the trading of expectation during the matching process and, in particular, during the discussion stage. After the matching process, the harmonised assumptions of both parties may subsequently look like the following:

Research candidate:

1. Get a doctorate
2. Prove that I can do it
3. Publish in peer reviewed journal

University:

1. Produce more doctorates
2. Get more research fund
3. Produce more researchers and experts in the field

7.6 The Expectancy Theory

Vroom (1964) proposes the expectancy theory, which submits that the behaviour of an individual on an issue is not based on clear objective reality but on the individual's perception of reality. And this perception of reality is formed from the context, worldview and expectations of the individual according to Balogun (2001). Therefore, the expectancy theory submits to the socio-constructivist school of thought that reality is socially constructed. In a way, it appears that the expectancy theory compliments both the concepts of reciprocal trading and psychological contracts in determining what informs the decision and action of individuals when faced with a situation of bargaining with other parties in which implicit expectation can significantly influence the outcome.

From the context of the practice-based research candidates these expectations have to be properly managed in a way that can make the implicit assumption to be explicit and open it for discussion and negotiation. In addition to the submission in psychological contracts to the extent that the process should be managed through purposeful discussion between the

candidate and the supervisor, the use of experiential learning model (Kolb, 1976; Mann, 1998) appears to have the capability of adequately managing the process.

7.7 Experiential Learning Model

Kolb (1984) offers the experiential learning model that could help managers and practitioners to learn and generate valid knowledge in practice. It involves the four cardinal points on a matrix, which revolves clockwise from the *phenomenon/concrete experience* to *collecting data/reflective observation*, to *reinforcement with theories/abstract conceptualisation* and finally, *re-engagement/active experimentation* as shown in Figure 7.5 This model is borrowed from management theory to be used as the core of the development of theoretical model for practice-based research because it appears to have the capacity to help the practice-based researcher to be able to externalise the tacit knowledge of practice for the benefit of the academy. A key feature of the experiential model is reflection.

While observing that many very skilled practitioners may have difficulties in explaining what they have done in practice, Raelin (1997, p. 567) consequently advocates for a reflective practitioner whom he describes as having:

> the ability to uncover and make explicit to oneself what one has planned, observed or achieved in practice. Hence, it is concerned with the reconstruction of meaning. In particular, it privileges the process of enquiry leading to an understanding of experiences that may be overlooked in practice.

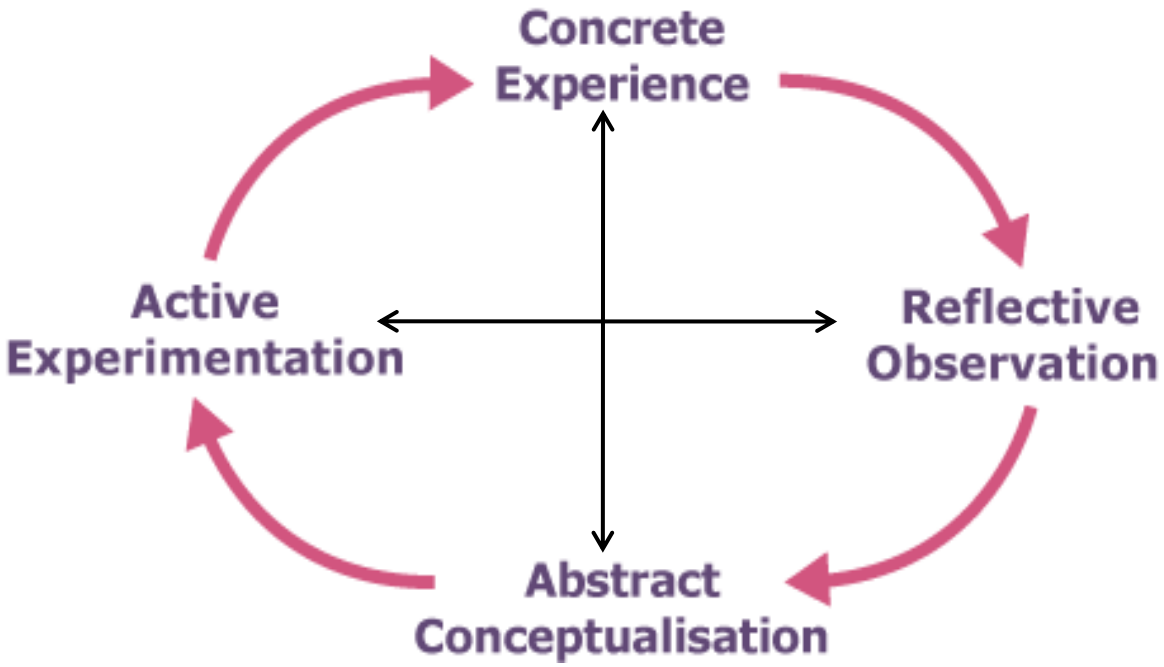


Figure 7.5: Experiential Learning Model (Kolb, 1984)

Raelin (1997), building on Dewey (1933), further opines that the art of *doing* alone does not produce learning or knowledge and for knowledge to be produced, *doing* must have the element of experimentation in finding out what *doing* is like. Adapting the experiential learning model of Kolb (1984), Mann (2011) demonstrates that the reflective practitioner oscillates between the two realms of professional practice and academic practice in an iterative way as depicted in Figure 7.6 trying to make explicit the tacit knowledge of practice. Both the academic researcher and the practice-based researcher utilise theory in their research. However, unlike academic researcher who starts with theory, practice-based researcher starts with a problem in practice but uses theory to shape the problem to make it researchable.

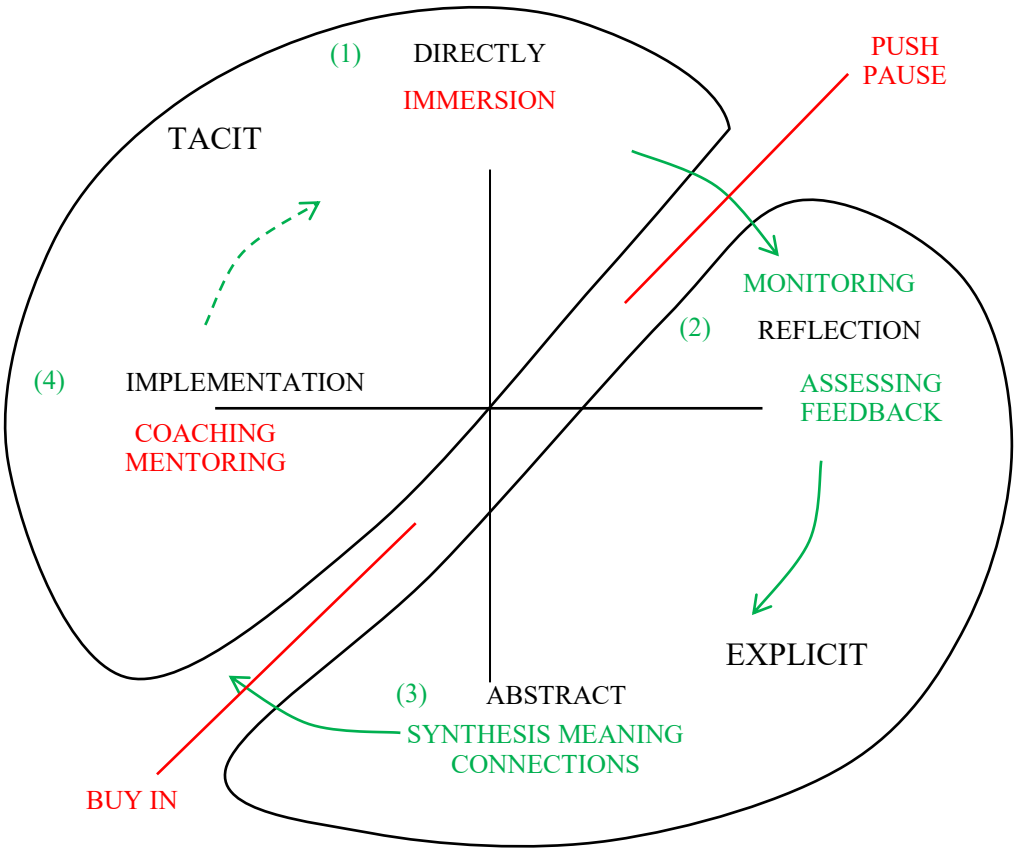


Figure 7.6: Reflection and the Practitioner Researcher (Mann, 2011, Nonaka & Takeuchi, 2005)

7.8 Theoretical Model for Practitioner Doctoral Research in Built Environment

7.8.1 The Building Blocks

The different concepts or theories advanced in this chapter provide the building blocks for the theoretical model for practitioner doctoral research in the built environment. The production of knowledge from practice that is acceptable to the academy must consider the key parameters hitherto espoused in the chapter even while remaining true to the philosophical orientation of the practitioner. Such knowledge must come through an established epistemological foundation of whether knowledge is external to the researcher or if the researcher has a role to play in its creation (Knight and Turnbull, 2008). This will also depend on the discipline from where the research is being conducted and, of course, recent research engagements favour interdisciplinary like the one being proposed for the built environment (Tait & Lyall, 2001; Foster, 2003; Krishnam, 2009). Since some

disciplines within the built environment, notably architecture and urban planning, might have developed a measure of interdisciplinary (Jantsch, 1972), the prospect of a built environment interdisciplinary is a feasible one (Chynoweth, 2009).

An idea of a theoretical model to guide research in the built environment could be seen as eclectic as it will be a combination of ideas from a plethora of disciplines with individual paradigm, approach and method but with a unified or collective focus towards a common goal of understanding and responding to the built environment phenomenon. For example, such common goal may be *to create an innovative built environment.* A doctoral research in the built environment must meet the four basic requirements of the Framework for Higher Education Qualifications at level 8 as objective requirements. However, objective requirements alone may not ensure a successful research, as tacit knowing may be more critical to success particularly within the knowledge base that is predominantly *soft* and *applied* and within the purview of the expectancy model. The concepts of *psychological contract* and *reciprocal trading* therefore provide useful tools for dealing with the complexities of the experiential learning model and reflection. The combination of the ideas from all these concepts, theories and models are harmonised to develop the 5-level theoretical model as described in sub-section 7.8.2.

7.8.2 The 5-Level Theoretical Model

The model in Figure 7.7 is a proposed 5-Level Theoretical Model for Doctoral Research in Built Environment. This model borrows from the concepts of *psychological contract* and *reciprocal trading* in organizational development (Austin, 1966; Kotter, 1973; Armstrong, 2006) and also *experiential learning model* (Kolb, 1976 & 1984; Mann, 1998; Nonaka & Takeuchi, 2005). The process of doctoral research in the built environment is simply the management of expectations towards successful outcomes. Expectations can be explicit or implicit (Kotter, 1973; Armstrong, 2006). Vroom (1964) in the expectancy model opines that the behaviour of an individual in an organisation is not determined by some objective measures or reality but by the individual's perception of reality. How the individual behaves therefore depends on what the individual expects from reality. The expectation is mostly tacit and hidden within the subconscious and could therefore pose great challenge to externalise and understand it (Mann, 1998).

The 5-level model's design predicates on the understanding that the relationship between the university and the doctoral student is a contractual one with two types of contractual arrangements. There is the formal written contract as detailed in the learning agreement and the university code of practice for research degrees (University of Salford, 2015) and there is the unwritten psychological contract, which resides in the mind of both parties (Kotter, 1973; Armstrong, 2006). Both contracts produce expectations for both parties as enumerated at Level 1 of the model. However, the list of expectations provided at Level 1 is not exhaustive and can be developed based on context. *Reciprocal trading* is a complementary concept that is meant to ensure a seamless working relationship between the university and the candidate whereby one party is able to achieve his goals by making sure he provides the enabling environment in making the other party achieves its goals. Kotter (1973) defines psychological contract as, "an implicit contract between an individual and his organisation which specifies what each expects to give and receive from each other in their relationship". In other words, and within the context of the professional doctorate, the candidate will get what he wants provided he can give what the university needs and vice versa.

Level 2 is about problem engagement and the support system that is available to the professional doctorate candidate. The Experiential Learning Model (Kolb, 1984; Mann, 1998; Nonaka & Takeuchi, 2005) have been used here as the framework for engaging the problem and obtaining meaning which provide learning and knowledge because the research in context is a practitioner research. In engaging the problem, the candidate must first understand the phenomenon by establishing the main focus and consequently try to step outside the problem in order to have an objective reflection of it. This is the movement from the tacit to the explicit environment of problem resolution because the robust problem resolution or practitioner research methodology involves the continuous movements between the tacit and explicit environments in an iterative way of combining tacit knowledge base with the explicit framework of objective reality (Mann, 1998 & 2011).

Next, the researcher must collect relevant data that could assist in understanding the explicit nature of the problem and help in its resolution. The data can be generated from personal experience or the experiences of other people though reflection. This stage should be closely linked with the development of appropriate conceptual framework or abstract connections with the data and the problem in context. The conversion between the data

collection stage and the conceptual framework stage is referred to by Nonaka & Takeuchi (2005) as explicit to explicit conversion.

Having collected the relevant data and considered the relevant connections or concepts and axiomatic within the explicit environment, the application of the results of the analysis is achieved by moving into the tacit environment again in a repetitive cycle. The key component of this model is the iterative movement between the familiar domain of practice and the alien terrain of academia (Mann, 2011). In this process, the practitioner who is confronted with a research problem is able to step aside from the problem, collect relevant data, consider the concepts and axiomatic, establish a solution and apply the solution.

The result of the iterative process is then sent into the central matching process as shown in Figure 7.7. However, during the period of problem engagement, the candidate is availed with the university support system including among others, supervision, communities of practice (cohort), library, workshop and conferences. There is need for constant interaction between the support system and the experiential learning model to ensure efficiency and effectiveness. In fact, the operations of the experiential learning model are shaped by the quality of the support system that is provided. These processes are not sequential or linear but iterative.

Level 3 is the matching process or the central processing unit that takes expectations from the parties, results from the problem engagement, and results from the support system. Added to these are policies, procedures, agreements, payment systems, academic culture, assignments, research proposal, interim assessment, internal evaluation and the viva voce. They are all matched together to produce outcomes. During the matching process, some items are sent as feedback either to problem engagement or support system for refinement or further processing. Although the matching process is shown as a single event at Level 3, there are mini-matching processes on-going at Levels 1 and 2 to refine the decisions that finally feed into the main matching process.

At Level 4, Outcomes have emerged from the process. This is the time for stocktaking where parties compare the outcomes with their initial expectations. Of course, some planned expectations may not be realized while some unplanned expectations may be realized.

Finally, at Level 5, the Doctorate in the Built Environment is awarded. It should be noted however that this model could be applied to any professional doctorate. While the explanations above are specific to when the practice-based researcher is aiming to acquire a doctoral degree, the model could also apply where the practice-based researcher is simply doing research without a doctoral degree in focus. In such scenarios, the university expectations, university support system and university outcomes would then be christened, sponsor's expectations, sponsor's support system and sponsor's outcome. From the concept of *epistemic drift* (Elzinga, 1985), it is clear that most contemporary research initiatives have sponsors. These sponsors, who are mainly from the industries, do have different expectations and support systems.

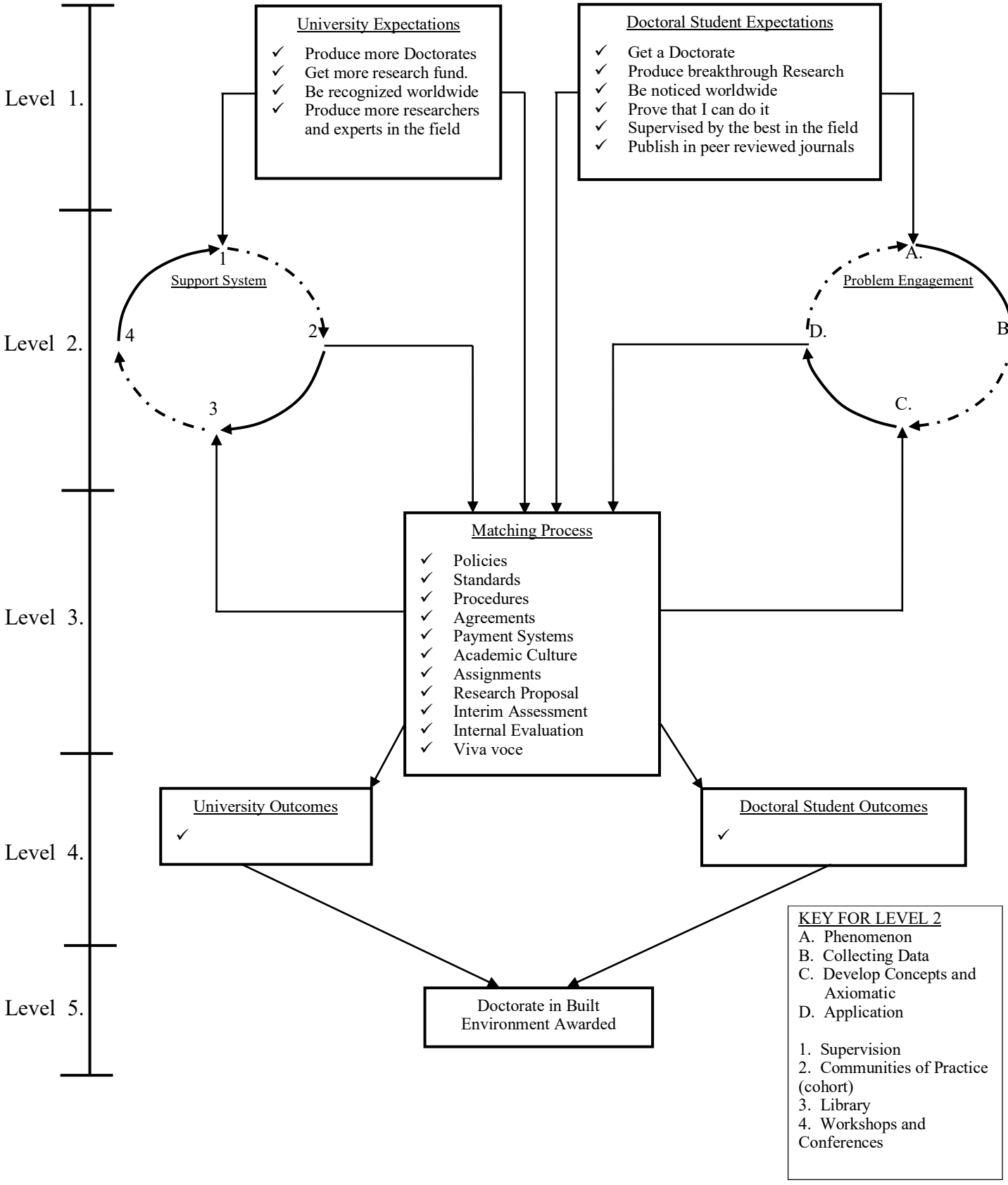


Figure 7.7: A 5–Level Theoretical Model for Practitioner Doctoral Research in Built Environment After (Vroom, 1964; Kotter, 1973; Armstrong, 2006; Kolb, 1984; Mann, 1998 & 2011; & Nonaka & Takeuchi, 2005)

7.9 Summary

This chapter considered the built environment within the context of discipline and interdisciplinary and discussed how the present knowledge base could provide a framework for research at doctoral level. Using the Biglan model and the Jantsch model and their adaptations by Chynoweth (2009) as bases for analysis, the chapter recognised that the built environment and its knowledge base cuts across many heterogeneous disciplines with different characteristics which provide a challenge for research in the built environment but which could however be addressed through interdisciplinary.

Tracing knowledge production from historical to contemporary approaches, the chapter identified the apparent traditional domineering influence of the academic approaches of explicit knowledge production over the practice-based reflective production of tacit knowledge. However, due to the pedigree of the practitioner researcher and the opinion of Polanyi (1966) that "we can know more than we can express", a practitioner researcher according to Mann (1998) should "externalize tacit knowing" to bring about meaning through a fast unfolding new way of producing knowledge through experiential learning.

Using the QAA four key requirements, the chapter identified the key issues of doctorateness and finally proposes a 5-level theoretical model for practitioner research at doctoral level in the built environment by using ideas from expectancy theory and the concepts of psychological contract, reciprocal trading and experiential learning. It argues that although the methodology of practice-based doctorates like DBEnv is different from the PhD, it is as rigorous. The chapter concludes that the 5-level model presents a rigorous method for practitioners to carrying out research and producing knowledge in the built environment and for obtaining a professional doctorate. This model may enable academic researchers to show more understanding and consideration in their objections to the contextual subjectivity of practice-based research. Those in academe are more likely to be convinced not only of the rigour and robustness of the processes of practice-based research, but of the validity of knowledge generated from practice.

CHAPTER EIGHT

8.0 EXPLORATORY WORKS

8.1 Introduction

This chapter argues and presents the case for the exploratory works. In Chapter 1 the nature of the problem was identified as compressed timelines during pre-contract documentation in the Nigerian construction industry. This is from the experience of a professional practice firm, through the eyes of the practitioner, on the procurement of a 500-seat lecture theatre for a higher educational institution. Although there is a plethora of literatures like Aibinu and Jagboro (2002), which allude to the serious problems of improper time planning and delays in the Nigerian construction industry, they seem to concentrate on post-contract time planning and delays rather than pre-contract time allocation. This suggests that very little may be known on the effects of pre-contract timeline and how quantity surveying (QS) firms are dealing with it. The suggestion of the existence of compressed pre-contract time may therefore be an eye opener. However, there is need for empirical evidence to support the claim that there are serious problems of time allocation during the pre-contract period. The importance of this is to avoid carrying out a doctoral thesis based on the *cry of a lone wolf*. This exploratory work is the subject of this chapter.

Two basic sets of options or methods are available for the exploratory work: one is in the quantitative tradition while the other is in the qualitative tradition. A survey, from the quantitative tradition, could be conducted among the population of practicing QS firms in Nigeria to determine if and how many of the firms do experience the problem. Although such a survey may be useful in breadth by providing the number of firms experiencing the situation in Nigeria, it may however be significantly handicapped in depth and in its ability to bringing out other latent features that may be relevant to the main doctoral study. However, since a major feature of the research is to look into how QS firms are using innovation in resolving compressed time problems, it may be difficult in a questionnaire to separate those firms that are innovative from those that are not innovative.

Being innovative is not only about the firm saying that they are, through a questionnaire, but also about the firm being seen to be innovative by an investigator who combines data

provided by the firm with data obtained through direct observation. And this could reasonably be done by a qualitative methodology like a case study. Rather than finding out if a significant number of QS practice firms are experiencing the problem, it may be more relevant to understand how the affected firms use innovative ideas in dealing with the context-dependent phenomenon (Flyvbjerg, 2006). For the exploratory work to be able to firm up the main doctoral work therefore, it must be able to go to some considerable depth asking relevant questions. And depth is a function of a qualitative strategy (Flyvbjerg, 2006).

Case study, as a qualitative methodology appears to be ideal and is selected amongst the methods because aside being very appropriate in asking the *how* and *why* questions, it has the potential of combining interviews with documentary evidence and personal observation (Yin, 2009; Flyvbjerg, 2006). This provides the opportunity to triangulate the data and the methods for the reliability of the results. Hence, apart from the appropriateness of case study as the selected exploratory method and its ability to dig deeper during interviews, it has the potential of bringing out other hidden features of the problem that are hitherto unknown and that may assist in firming up the case study protocol for the subsequent main doctoral work.

8.2 Aim and Objectives

The aim of the exploratory work is to understand how a QS firm in the Nigerian construction industry uses innovative methods in responding to the specific challenge of compressed time demands during pre-contract documentation and consequently to firm up the larger doctoral study. Subsequently, the key objectives are:

1. To review existing literature on innovation in QS firms.
2. To review the practice background and research context of innovation in pre-contract documentation in QS firms in Nigeria.
3. To explore how a QS firm uses innovation in responding to compressed time demands for pre-contract documentation in Nigeria.
4. To analyse the major factors at play in innovation in a QS firm.
5. To assess appropriate research methodologies to study this type of phenomenon in relation to the adequacy of the data collection tools in preparation for the doctoral research.

6. To firm up the study and provide recommendations for action towards the larger doctoral study.

8.3 The Firm and the Rationale

For this exploratory work, a QS firm in the north west geopolitical zone is selected for the case study. The exploratory case study firm was established in 2004 and registered with both the Nigerian Institute of Quantity Surveyors and the Quantity Surveyors Registration Board of Nigeria. It has staff strength of four and about 75% of the firm's commissions come from public sector clients. The firm operates mainly in the building construction sector with few incursions into civil engineering projects. The case study protocol for the exploratory work is as detailed in Appendix B (p. 294). Two people were interviewed in the firm to represent the management and the operation viewpoints respectively. The first interview was conducted with the Principal Partner while the second interview was conducted with the Chief Quantity Surveyor. During the interview however, the operations in the firm were observed. The selection of the firm for exploratory study was done on the following rationale:

1. The firm is known to be innovative, although not in the big league, in the north-west geopolitical zone of the country.
2. There is time constraint, as the doctoral research needs to be completed within a fixed timeframe. Since the investigator is based in the north-west geopolitical zone, it is only ideal and convenient to select the responding firm from the north-west geopolitical zone.
3. There is no need to expand the exploratory work out of proportion by conducting multiple case studies. If multiple case studies are conducted at this level, it may assume the stature of a different project that could further consume the limited time.
4. Cases are not like statistical samples but are like experiments (Yin, 2009) meant to either challenge or support an existing theoretical proposition. The number of cases is not so relevant at this point because its essence is for analytic generalisation (Yin, 2009) or transferability (Lincoln and Guba, 1979, Moriceau, 2010) rather than statistical generalisation. At any rate, statistical generalisation appears to be considerably overrated as the main source of scientific knowledge (Flyvbjerg, 2006).

8.4 Process Model and Template Development

8.4.1 Process Model Development

Barrett *et al.* (2008) refer to the two clusters of thoughts in literature concerning the process of innovation in firms: the rational school and the behavioural school. While the rational school of thought sees innovation process as linear steps to be followed right from initiation to diffusion (Maidique, 1980), the behavioural school of thought offers that innovation process is that of controlling chaos whereby there are many divergent and convergent behaviours with no identifiable steps to be followed (Quinn, 1985; Van de Ven *et al.,* 2008). Of course, every strategic process needs a plan of activities even though strategy in most cases is iterative and may be difficult to follow a definitive path (Johnson and Scholes, 1999). From the viewpoints of Van de Ven *et al.* (2008) and Johnson and Scholes (1999), there should be a compromise whereby both schools of thought in innovation process could be harmonised wherein the elements of both views are incorporated. This harmonised viewpoint forms the basis of the innovation process model development in this section.

The adopted definition of innovation for this study, the characteristics of construction innovation models discussed in Chapter 3, the professional service firms and pre-contract practice discussed in Chapters 4 and 5 respectively provide the salient views, concepts, theories from literature from which a theoretical model could be built within the harmonised school of thought. The essence of the theoretical model is to have a process innovation model through either *analytic generalisation* (Yin, 2009) or *transferability* and *fittingness* (Lincoln and Guba, 1985; Moriceau, 2010), which could be used to interpret the triangulated data from three sources of data collection of interview, documents and personal observation. Models and frameworks are very important to firms in executing any successful innovation strategy as evidence shows that organisations like Phillips, Siemens, and GE who have been successful innovators owe their successes to the systemic architecture of their operations (Kanter, 1997). Specifically, the underpinning concepts and theories that inform the innovation process model are summarised hereunder according to the following key components of the model:

1. Initial steady state
2. Shocks/Stimuli
3. Optional trajectories

4. Action and reaction forces
5. Resultant steady state

8.4.1.1 Underpinning Concepts and Theories

Initial Steady State

At some points in time, every organisation is at a steady state until impressed by certain internal or external force (Bessant *et al.,* 2005). Organisations are averse to change and tend to maintain the status quo, which Bessant *et al.* (2005, p. 1366) refer to as "relative stability". But change must happen anyway because organisations being organic (Pugh, 1993); must change either due to the internal encouraging forces or due to external compelling demands of market, policies and laws governing the operating environment (Kast and Rosenzweig, 1985). Before change happens, which may come in the form of innovation (Van de Ven, *et al.*, 2008) or in other forms, an organisation could be seen and taken as dwelling in a steady state, albeit temporarily. Every innovation, be it incremental or disruptive, starts by offsetting the existing steady state.

Shocks/Stimuli

While Bessant *et al.* (2005, p. 1367) agree to a steady state, they contend that, "occasionally something happens which dislocates this framework and changes the rule of the game" (see Table 8.1). Although these dislocations may not happen regularly, Bessant *et al.* (2005, p. 1367) further contend that, "they have the capacity to reframe the space and the boundary conditions" and "open up new opportunities" and also "challenge existing players". This appears to be the core of Joseph Schumpeter's theory of innovation when he refers to "creative destruction" (Schumpeter, 1934/1983). Other innovation scholars (Utterback and Abernathy, 1975; Slaughter, 1998; Christensen, 2005) use different terminologies to communicate similar idea.

While a *shock* appears to portray an unfriendly awakening, a *stimulus* connotes an encouraging urging-on. Shock/Stimulus is similarly referred to as the *unfreeze* step, where the steady state is disrupted, in the Lewin's 3-Step model of *unfreeze, develop* and *refreeze* (Lewin, 1943 and 1958). To *unfreeze* the present state, one has to change the forces that maintain the organisational operations at that present level. This in line with Lewin's thesis

that before one can effect a change in a current situation, one has to understand all the forces that maintain the current situation (Burnes and Cooke, 2013). Although the main reason for unfreezing under this investigation is as a result of compressed time demands by project promoters and clients during the pre-contract practice in the Nigerian construction industry, there are other internal and external relevant factors like competition with other professionals and embracing new technology to save time, which may cause discontinuity. Bessant *et al.* (2005) summarise some of the reasons why organisations may unfreeze or discontinue the present state on Table 8.1.

Table 8.1: Sources of Discontinuity (Bessant *et al.,* 2005)

Triggers/Sources of Discontinuity	**Explanation**
Emergence of new markets	Most markets evolve through a process of growth and segmentation. But at certain times completely new markets emerge which cannot be analysed or predicted in advance or explored through using conventional market research/analytical techniques
Emergence of new technology	Step change takes place in product or process technology. This may result from convergence and maturing of several streams (e.g. industrial automation, mobile phones) or as a result of a single breakthrough (e.g. LED as white light source)
Emergence of new political rules	Political conditions which shape the economic and social rules may shift dramatically, for example, the collapse of communism meant an alternative model – capitalist competition as opposed to central planning. Many ex-state firms couldn't adapt their ways of thinking.
Firms running out of road	Firms in mature industries may need to escape the constraints of diminishing space for product and process innovation and the increasing competition of industry structures by either exit or by radical reorientation of their business.
Sea change in market sentiment or behaviour	Public opinion or behaviour shifts slowly and then tips over into a new model, for example, the music industry is in the midst of a (technology-enabled) revolution in delivery systems from buying records, tapes and CDs to direct download of tracks in MP3 and related formats
Deregulation or shifts in regulatory regimes	Political and market pressures lead to shifts in the regulatory framework and enable the emergence of a new set of rules - e.g. liberalisation, privatisation or deregulation, environmental legislation.
Fractures along "fault lines"	Long-standing issues of concern to a minority accumulate momentum (sometimes through the action of pressure groups) and suddenly the system switches/tips over – for example, social attitude to smoking or health concerns about obesity levels and fast foods.
Unthinkable events	Unimagined and therefore not prepared for events which, sometime literally, change the world and set up new rules of the game.
Business model innovation	Established business models are challenged by a reframing, usually by a new entrant who defines/reframes the problem and the consequent "rules of the game".
Architectural Innovation	Changes at the level of the system architecture rewrite the rules of the game for those involved at the component level.
Shifts in "techno-economic paradigm" – systemic changes which impact whole sectors or even whole societies	Changes take place at a system level, involving technology and market shifts. This involves the convergence of a number of trends, which result in a "paradigm shift" where the old order is replaced.

Optional Trajectories

When change, particularly innovation, occurs in organisations Van de Ven *et al.* (2005, p. ix) opine that the manager "needs a *road map,* a process theory, that explains how and why the innovation journey unfolds and what path are likely to lead to success or failure" even though Bessant *et al.* (2005) affirm the absence of any guarantee formula for success. At the upper end of a continuum of series of options, William Coyne in the *foreword* to Van de Ven *et al*. (2005, p. vii) may have been very apt in comparing innovation journey to, "the journey along an uncharted river, led by individuals with ill-defined, conflicting and ambiguous goals, comprising both divergent and convergent behaviours" which could best be studied through "chaos theory". This is the dilemma of optional trajectories and perhaps where chaos theory is most likely to be required. Barrett *et al.* (2008, p. 14) however see innovation as, "a means to achieve sustainable competitiveness". Therefore, in consideration of the optional trajectories, it may be ideal and wise, to put attention on the option that guarantees sustainable competitiveness after considering organisational capability (Barrett *et al.*, 2008) in relation to market demands and structure.

Action and Reaction Forces

The works of Kurt Lewin on field theory and force field analysis (Lewin, 1943 and 1958) have tremendous impacts on innovation discourse, organisation management, change programmes, leadership and behavioural science (Schein, 1988; Burnes and Cooke, 2013). Lewin's thesis is that one has to understand all the forces that maintain the current situation before one can effect a change (Burnes and Cooke, 2013). His 3-Step model on change, which categorises the strategy for change management into three distinct but interrelated steps: *unfreeze*, *develop* and *refreeze,* provides the broad categorisations for the innovation process model in this chapter. While *unfreeze* stage deals with the point where the steady state is disrupted, *develop* stage aggregates all the tactical options available in responding to change. *Refreeze* takes the organisation to the next steady state and prevents it from returning to the status quo ante.

The tools for understanding and resolving the impacts of change during the *develop* stage are provided using the tools of Force Field Analysis (see Figure 8.1). Although force field analysis is an integral part of the larger field theory of Kurt Lewin, it is sometimes used as

a separate change initiative (Burnes and Cooke, 2013). Force Field Analysis premises on the opinion that in any change situation, there are two sets of forces acting against each other: the driving forces and the restraining forces. While the driving forces are the forces of change trying to move the organisation to a new state, the restraining forces are the forces that resist the change and seek to maintain the status quo. Force field analysis is not really about quantifying field forces and relationship as is normally presented in a number of literature but about understanding what people/organisation do and why they do it (Burnes and Cooke, 2013). Quantifying presupposes a realist school of thought but since this research is from the social-constructivist paradigm, understanding what people and organisations do within their context and why they do it is akin to the idealist school of thought.

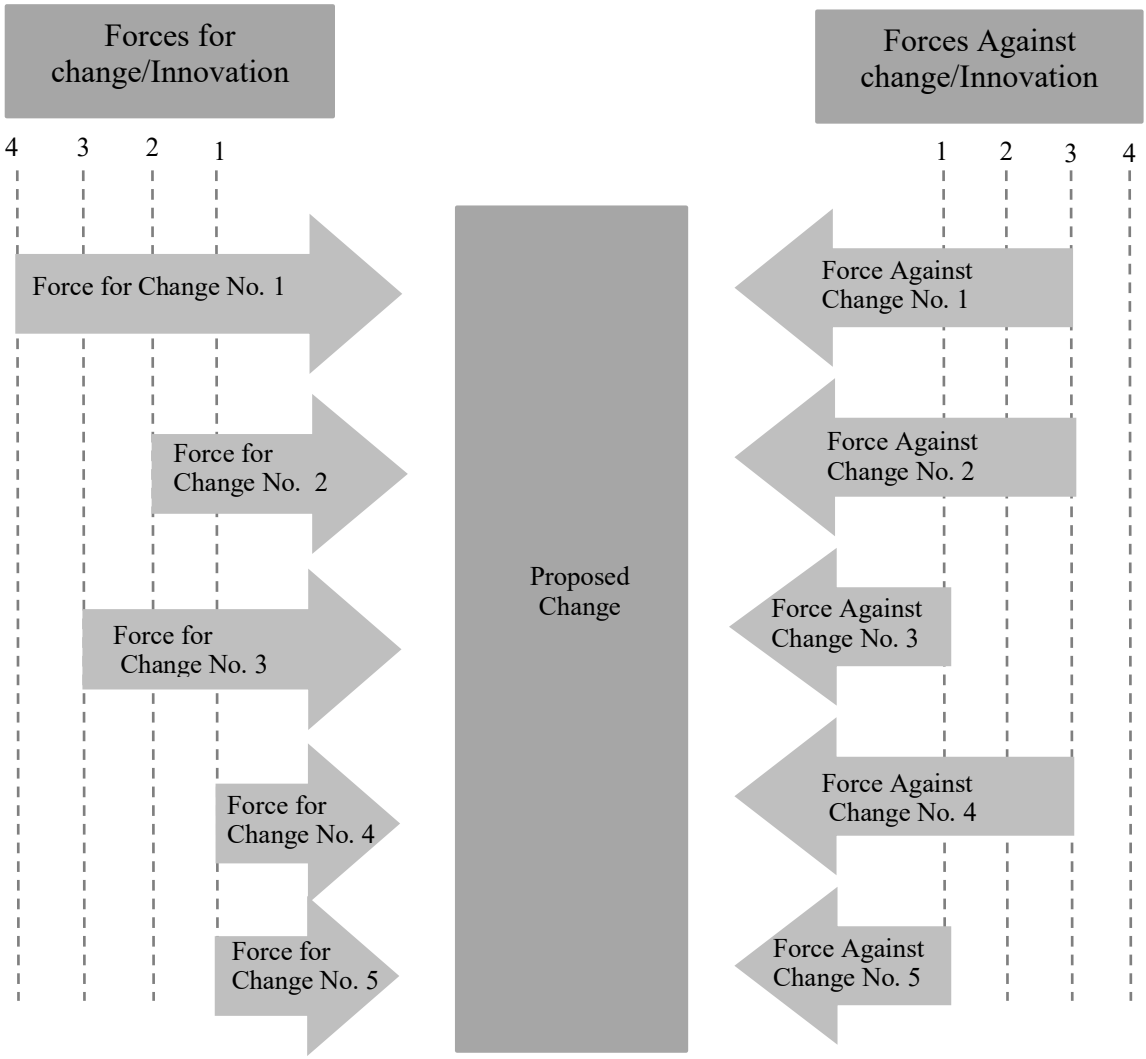


Figure 8.1: **Force Field Analysis (After Burnes and Cooke, 2013)**

Resultant Steady State

The resultant steady state could be equated to *refreeze* segment, the final arm, of the 3-Step change model of Kurt Lewin. Here, a new level of operations within the organisation is attained after the resolution of the effects of the action and reaction forces investigated during the previous *develop* segment. The resultant steady state can then be compared with the initial steady state to determine the value added or value destroyed by the change or innovation process (Kimberly, 1981; Capaldo *et al.,* 1997; Barrett *et al.,* 2008).

8.4.1.2 Theoretical Model Development

From Bessant *et al.* (2005), innovation process represents the closing up of the innovation gap, which becomes obvious from the discontinuity of the current steady state and ends with the establishment of a new steady state. This gap is made manifest through shocks or stimuli to the steady state (Van de Ven *et al.,* 2005). Furthermore, Barrett *et al.* (2008, p. 71) opine that innovation process involves "an interplay between forces of *action* and *reaction* over time which progresses or hinders the closing of the innovation gap between the current level of performance and a desired level of performance". Van de Ven *et al*. (2005) stresses the need for a road map in moving from one steady state to the other. This supports the need for a model that guides innovation process particularly in organisations that have the same contextual architecture.

These viewpoints could be explained within the field theory of Kurt Lewin (Lewin, 1943 and 1958) which proposes that one has to understand all the forces, be it action or reaction, that maintain the current situation before one can effect a change to another situation (Burnes and Cooke, 2013). The idea of change and innovation is further made clear by the concept of the Force Field Analysis, extracted from the field theory of Kurt Lewin, which sees a continuous contest between the two sets of forces (action and reaction) at every stage on the change or innovation process. Barrett *et al.* (2008) predict the result of these contests in innovation as either successful or a failure. Innovation is successful when "the action forces, over time, have overcome the reaction forces" (Barrett *et al.,* 2008, p. 73). In other words, innovation in this case is beneficial and there is value added (Kimberly, 1981). The contest could also be a failure when "the reaction forces" are "stronger than the action forces" (Barrett *et al.,* 2008, p. 73). In other words, innovation in this case is not beneficial and it destroys value. This type of innovation is referred to as mistakes that may

constrain the organisation (Kimberly, 1981; Capaldo *et al.,* 1997). These concepts, propositions and theories provide the foundation and the fabric for the innovation model in this chapter.

In addition to the above concepts, propositions and theories, literatures in Chapters 3, 4 and 5 offer:

- That innovation in professional service firms is a process that is caused by a disruption to the steady state of the firm either through the external or internal environment.
- That professional service firms respond to such disruptions in different ways depending on its nature and the resources available.
- That the quality of documents produced during the pre-contract stage of any project goes a long way in determining the success of the project in later stages hence, a disruption to that process could have serious consequences.
- That the outcome of any disruption to the steady state would be determined by responses from a trade-off between series of action and reaction forces on issues that border on organisational capacity, technical ability, financial capacity and knowledge capital.

8.4.1.3 The Model of Innovation Process

These aforementioned key points are represented within the following components of Figure 8.2:

1. Initial steady state; from point 0 to point 1
2. Shock/Stimulus; from point 1 to point 2
3. Optional trajectories; from point 2 to point 4 and from point 2 to point 5
4. Action and reaction forces; from point 5 to point 8
5. Resultant steady state; from point 8 upwards.

The intention of the model is to be used to analyse the soft data that result from the exploratory study as it relates to the high-level themes that would emerge from literature. The key characteristics of the model are discussed on three levels as follows:

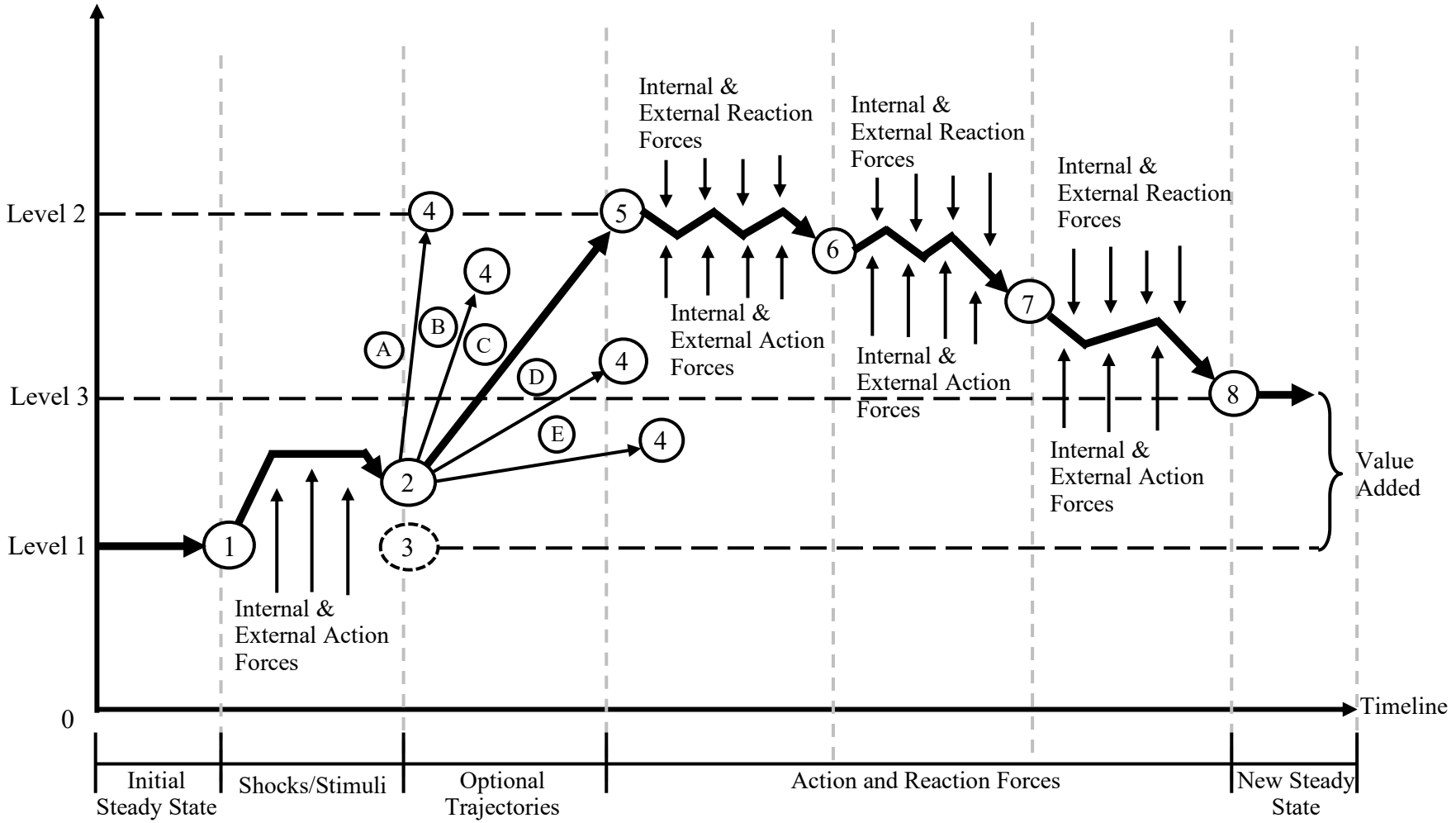


Figure 8.2: **Model Of Innovation Process in QS firms** [After Lewin (1943 & 1958); Slaughter (1998); Bessant *et al.* (2005); Van de Ven *et al*. (2008); Barrett *et al*. (2008) and Ackoff (1981)]

Key to Figure 8.2**:**

Point at where the steady state is disrupted by shocks or stimulus
Generation of many new divergent ideas through brainstorming
Breakaway point of initial steady state
Terminal point for unsuccessful divergent ideas
Untested new idea ready for assessment and implementation
Intermittent balance of the effects of action and reaction forces
Intermittent balance of the effects of action and reaction forces
Commencement of the new steady state
New divergent ideas generated through brainstorming
Action/Reaction Forces
Innovation Trajectory

Level 1

Level 1 is the starting point of innovative ideas as it represents the steady state until there is a shock either from the external or internal environment, which disrupts the steady state through the excessive presence of initial action forces (see Lewin, 1943). The shock could come from the external environment in which case, it will be a reactive or demand-pull innovation. However, it could also be as a result of a direct intervention introduced internally, in which case, it will be proactive or resource push innovation. In the context of this investigation, it is taken that the client's demand for compressed timeline during the pre-contract practice is a shock that disrupts the steady state of the normal contract documentation process. Before the shock, it was business as usual. However, after the shock, panic sets in as the consultants are now struggling to develop new strategies that could respond to the shock, for instance, the production of all contract documents within a week.

Level 2

Level 2 signifies the maximum displacement that the effect of the initial action and reaction forces could present. Barrett *et al*. (2008) define this gap between Level 1 and Level 2 as the *innovation gap*. The chasm is at its peak mostly during radical innovation while incremental, modular, architectural and system innovation find some relevance at different points between levels 1 and 2 (Slaughter, 1998). At point 2, several ideas are generated on how to deal with the shock but most of the ideas may not be feasible due to the constraints highlighted in Barrett *et al*. (2008) in generic innovation model as context, focus, organisational capability and, outcomes. Any feasible idea at point 2 would move to

point 5 and subsequently undergo series of further tests from the action and reaction forces as identified in the generic and knowledge-based innovation models.

Level 3

Level 3 represents the new steady state achieved at point 8 after going through the whole process. However, level 3 does not necessarily have to be a decline from level 2 as shown in the model. There is probability that it may be an increase over and above level 2 as its final position depends on the resultant compromise between the competing action and reaction forces. The difference between levels 1 and 3 represents the value added, the outcome of the innovation process.

8.4.2 Template Development

A key aspect of template analysis is the development of a *coding template* to be used for the coding and analysis of data (King, 2012). Template development would be a lot easier if there are *a priori* themes already identified in the body of literature. In generating these *a priori* high-level themes, it is important to keep the aim and objectives of the exploratory study in focus so that the themes so generated may have the additional capacity of addressing the aim and objectives as listed. In a way, such themes may help to perform the functions of the research questions. Through the literature reviewed and the objectives set out in the previous chapters, the following *a priori* high-level themes are generated:

1. Information on the occurrence of compressed time demand
2. Causes of compressed time demands
3. Responses to compressed time demands
4. Outcome of responses to compressed time demands
5. Advice for policy and practice
6. Methodology for investigating compressed time demands practice-based problems.

These themes are represented on Table 8.2. Empirical data in this exploratory study are consequently analysed using coding template. However, the development of a coding template is central to a successful template analysis (King, 2012) and for this study however, coding template is developed from the key themes that have emerged from literature. In order to appropriately code the empirical data, the respective high-level themes are subsequently broken down into middle level themes and finally into low level themes as shown on Table 8.8. The developed template would then form the framework

for coding the respective responses obtained during the interview as presented in section 8.5 below. The first step is the identification of the key high-level (broad) themes that are relevant to the aim and objectives of the study. Secondly, the emerging themes from literature are identified. These emerging themes are synthesized into the key high-level themes that have already been identified as necessary for addressing the aim and objectives of the study. If there are themes emerging from literature but which could not be easily fitted into the already identified high-level themes, additional high-level themes may be created for such emerging themes. Table 8.2 shows the proposed high-level themes required in addressing the aim and objectives of this study while Tables 8.3-8.7 show the emerging themes from literature.

Each of Tables 8.3-8.7 is divided into three columns respectively showing the reference/code, the emerging theme and, the relevant high-level theme to which the emerging theme is applicable. For instance, Code 1.1 refers to the first emerging theme from Chapter 1 while Code 1.2 refers to the second emerging theme from Chapter 1. Subsequently, the emerging theme for Code 1.1 is, “knowledge is created from practice” while the emerging theme for Code 1.2 is, “there are increasing demands from public sector clients for consultants to be more efficient in the delivery of services”. Subsequently, the relevant high-level themes applicable to Code 1.1 are: A and F while that of Code 1.2 is B. Details of A, F and B are shown on Table 8.3.

Table 8.2: Proposed High-Level Themes

REFERENCE	HIGH-LEVEL THEMES	REMARKS
A	Information on the Occurrence of Compressed Time Demands	INFORMATION
B	Causes of Compressed Time Demands	CAUSES
C	Response to Compressed Time Demands	RESPONSE
D	Outcome of Responses to Compressed Time Demands	OUTCOME
E	Advice for Policy and Practice	ADVICE
F	Methodology of Investigating Compressed Time Demands	METHODOLOGY

Table 8.3: Emerging Themes in Chapter 1

REFERENCE OR CODE	EMERGING THEMES	RELEVANT HIGH-LEVEL THEME APPLICABLE
1.1	Knowledge is created from practice	A, F
1.2	There are increasing demands from public sector clients for consultants to be more efficient in the delivery of services.	B
1.3	There are increasing demands from public sector clients for consultants to be more effective in the delivery of services.	B
1.4	There is always a lot of pressure on the public sector clients to deliver projects within short timescales.	B
1.5	Consultancy firms are forced to listen to the market demands and their innovation strategy is more of market pull than resource push.	B, C
1.6	Innovation could enable the QS firm to be able to provide the right service to meet the market demand.	D, E

Table 8.4: Emerging Themes in Chapter 3

REFERENCE OR CODE	EMERGING THEMES	RELEVANT HIGH-LEVEL THEME APPLICABLE
3.1	Innovation is the effective generation and implementation of a new idea that enhances organisational performances.	C
3.2	Construction innovation is very slow.	B, C
3.3	Small professional firms are disadvantaged in innovation literature and practice.	B, C
3.4	Project-based organisations have temporary relationships and this discourages innovative initiatives on future projects.	B, C
3.5	The use of software like spreadsheet and bespoke applications for pre-contract documentation is incremental innovation	C, D
3.6	Successful innovation outcomes depend on innovation focus, responsive to contextual factors and realised through appropriate organisational capabilities.	C, D
3.7	Ability of a QS professional firm to innovate depends on the knowledge capital within the firm	C, D
3.8	Knowledge capital is the organisation's memory and comprises human capital, relationship capital and structure capital	A, C
3.9	Consultant QS firms in Nigeria do innovate but there is no record of strategic innovation plan hence, innovation is haphazard.	A, B

Table 8.5: Emerging Themes in Chapter 4

REFERENCE OR CODE	EMERGING THEMES	RELEVANT HIGH-LEVEL THEME APPLICABLE
4.1	Professional service firms need to innovate to be able to provide efficient and effective services to clients	B
4.2	Small professional service firms have some distinct characteristics different from the large firms and this should be considered when considering innovation in firms.	C

Table 8.6: Emerging Themes in Chapter 5

REFERENCE OR CODE	EMERGING THEMES	RELEVANT HIGH-LEVEL THEME APPLICABLE
5.1	Different firms respond differently to the compressed time demands during pre-contract documentation.	C
5.2	There is need to generate new ideas, techniques or processes that will enable firms to respond to client requirements on time.	C, D

Table 8.7: Emerging Themes in Chapter 6

REFERENCE OR CODE	EMERGING THEMES	RELEVANT HIGH-LEVEL THEME APPLICABLE
6.1	Knowledge from practice is valid knowledge	A, D, F
6.2	Reflection is a reliable tool in capturing practice-based knowledge.	C, F
6.3	Awareness and use of IT is gaining prominence in Nigerian QS firms.	A, C
6.4	Research methodology for an investigation must be sympathetic to the phenomenon being investigated.	F
6.5	The research philosophy for investigating innovation in QS firms is that of idealism, interpretivism and values-laden.	F
6.6	The research approach for investigating innovation in QS firms is a case study.	F
6.7	The research technique suitable for the analysis of data for this investigation is template analysis	F

Figures 8.3 shows how all the emerging themes are synthesised into the six high-level themes of, Information, Causes, Response, Outcome, Advice and Methodology respectively which combine to address the aim and objectives of this study (please refer to Table 8.2, p. 137 for details of the high-level themes). Table 8.8 shows how the emerging themes (now developed into middle and low-level themes) relate to the high-level themes in the form of a template that can be used for coding the interview transcripts. It should be noted however that high-level theme F, Methodology, is omitted from Table 8.8 because it was not a feature of the interview questions. Rather, it was a feature of data from literature and the aim and objectives. The conclusion drawn from the emerging themes on methodology is stated in the "Appropriate Research Methodologies" in section 8.7.1.5 (p. 162).

The key resource centres of Figure 8.3 are Information, Causes, Response, Outcome, Advice and Methodology. They combine to address the aim and objectives of the study. These key resource centres, with the exemption of Methodology, constitute the High-Level Themes as shown in the first column of Table 8.8. The subsequent Middle Level and Low-Level Themes on Table 8.8 are also the issues that inform the key resource centres of Figure 8.3. Therefore, Table 8.8 is a tabular representation of Figure 8.3 in order to present a platform for the coding and analysis of the empirical data.

Although Tables 8.9 to 8.11 represent the key ideas captured during the interview, cognisance is taken of the fact that due to the philosophical position of the research and the instrument of data collection, the tables may not capture some of the very subtle opinions expressed by the respondents. These subtle differences are covered under the discussion section. Hence, both the tables and the discussions should be read together for a full understanding of the interview.

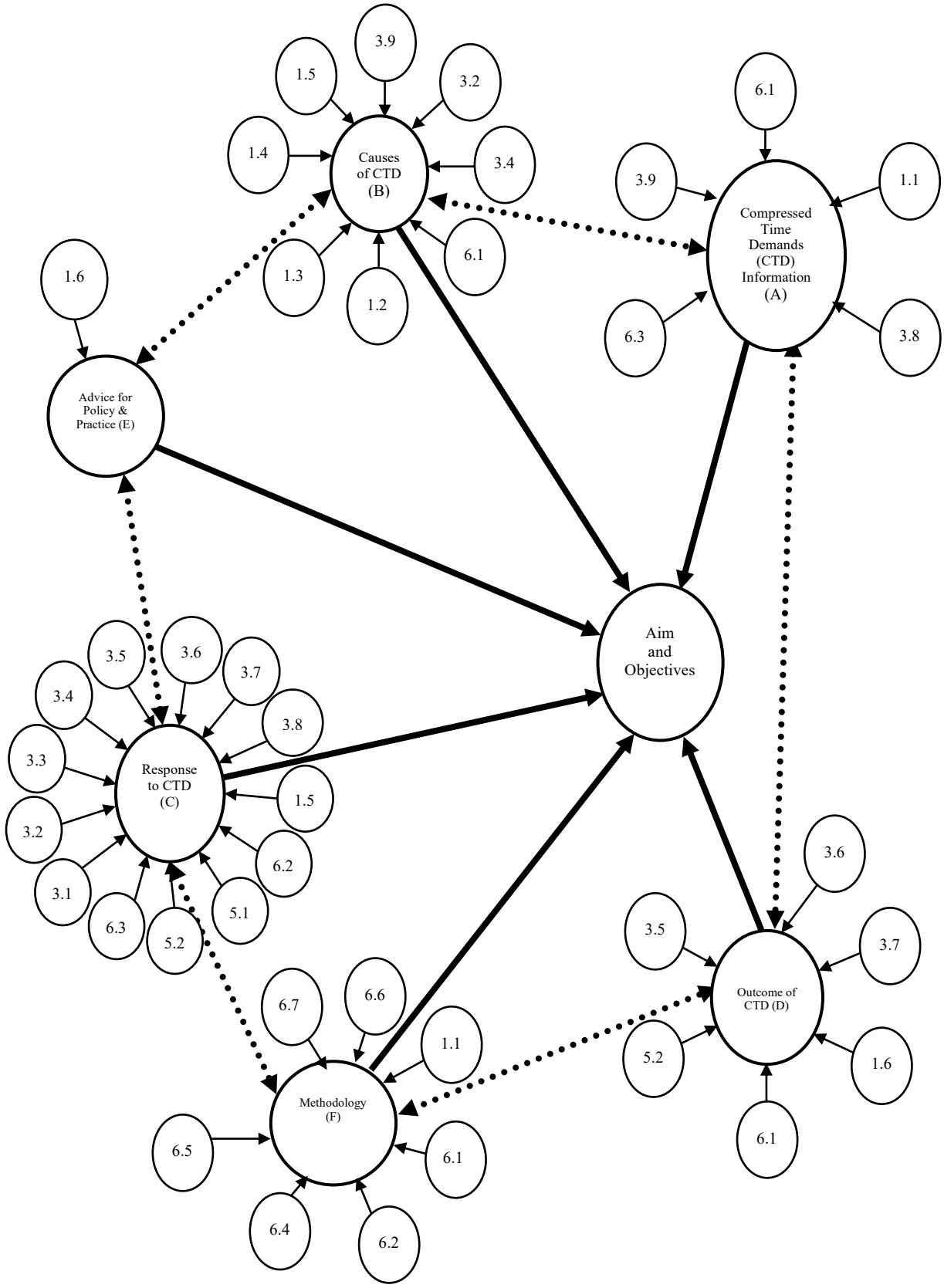


Figure 8.3: Morphology of Themes and how they address the Aim and Objectives

Key to Figure 8.3:

Symbol	Detail
	Linking of the coded themes
	How the themes are linked with the objectives

Table 8.8: Template of Synthesized Emerging Themes from Literature & Practice

HIGH LEVEL THEMES	MIDDLE LEVEL THEMES	LOW LEVEL THEMES
COMPRESSED TIME DEMANDS INFORMATION (A)	Do firms experience it?	Private projects Public projects
	When do they experience it?	Pre-contract stage Post-contract stage Commissioning stage
CAUSES OF COMPRESSED TIME DEMANDS (B)	Market pull	Client demand Competition Technology vendor demand
	Resource push	Financial availability Tacit knowledge demand Explicit knowledge demand Technology requirements
RESPONSE TO COMPRESSED TIME DEMANDS (C)	Innovative methods	Meets innovation definition Technological innovation Organisational capacity
	Action forces	Partner's drive Staff ownership of process Supportive resources Fear of competition Client demand Survival strategy
	Reaction forces	Partner's lack of interest Lack of staff commitment Inadequate firm capability Lack of financial resources
OUTCOMES OF RESPONSE TO COMPRESSED TIME DEMANDS (D)	Successful	Improved service to clients Efficient delivery of service Effective delivery of service Operational improvement Growth of the firm Satisfied staff
	Unsuccessful	Gained new insights Lost jobs from the client
ADVICE TO INDUSTRY (E)	Government policies	Start budgeting on time Use in-house professionals
	Practice	Need to innovate to survive Use simple technology in-house Train staff to use technology Innovation can ensure growth

8.5 Results

8.5.1 Interview 1

Table 8.9: Interview Result 1

HIGH LEVEL THEMES	MIDDLE LEVEL THEMES	LOW LEVEL THEMES	1ST RESPONDENT
COMPRESSED TIME DEMANDS INFORMATION (A)	Do firms experience it?	Private projects	No
		Public projects	Yes
	When do they experience it?	Pre-contract stage	Yes
		Post-contract stage	No
		Commissioning stage	No
CAUSES OF COMPRESSED TIME DEMANDS (B)	Market pull	Client demand	Yes
		Competition	Yes
		Technology vendor demand	No
	Resource push	Financial availability	Yes
		Tacit knowledge demand	No
		Explicit knowledge demand	No
		Technology inadequacy	No
RESPONSE TO COMPRESSED TIME DEMANDS (C)	Innovative methods	Meets innovation definition	Yes
		Technological innovation	Yes
		Organisational capacity	No
	Action forces	Partner's drive	Yes
		Staff ownership of process	Yes
		Supportive resources	Yes
		Fear of competition	Yes
		Client demand	Yes
		Survival strategy	Yes
	Reaction forces	Partner's lack of interest	No
		Lack of staff commitment	No
		Inadequate firm capability	No
		Lack of financial resources	Yes
OUTCOMES OF RESPONSE TO COMPRESSED TIME DEMANDS (D)	Successful	Improved service to clients	Yes
		Efficient delivery of service	Yes
		Effective delivery of service	Yes
		Operational improvement	Yes
		Growth of the firm	No
		Satisfied staff	Yes
	Unsuccessful	Gained new insights	Yes
		Lost jobs from the client	Yes
ADVICE TO INDUSTRY (E)	Government policies	Start budgeting on time	Yes
		Use in-house professionals	Yes
		Be wary of in-house professionals	No
	Practice	Need to innovate to survive	Yes
		Use simple technology in-house	Yes
		Train staff to use technology	Yes
		Innovation can ensure growth	Yes

Summary of Interview 1

This firm do experience compressed time demands from clients on public sector projects regularly at the pre-contract stage. Compressed time demands are usually caused by the inability of the clients to plan well ahead of time. Due to the interest of both partners and staff in new ideas, this firm has been responding to the challenges of compressed time demands using some in-house innovative methods, which are less expensive but very effective. It is recommended that public sector projects should be planned on time but QS firms should also be ready with innovative ideas on how to respond to the challenges of any compressed time demand whenever it occurs.

8.5.2 Interview 2

Table 8.10: Interview Result 2

HIGH LEVEL THEMES	MIDDLE LEVEL THEMES	LOW LEVEL THEMES	2ND RESPONDENT
COMPRESSED TIME DEMANDS INFORMATION (A)	Do firms experience it?	Private projects	No
		Public projects	Yes
	When do they experience it?	Pre-contract stage	Yes
		Post-contract stage	Yes
		Commissioning stage	No
CAUSES OF COMPRESSED TIME DEMANDS (B)	Market pull	Client demand	Yes
		Competition	Yes
		Technology vendor demand	No
	Resource push	Financial availability	Yes
		Tacit knowledge demand	No
		Explicit knowledge demand	No
		Technology inadequacy	Yes
RESPONSE TO COMPRESSED TIME DEMANDS (C)	Innovative methods	Meets innovation definition	Yes
		Technological innovation	Yes
		Organisational capacity	No
	Action forces	Partner's drive	Yes
		Staff ownership of process	Yes
		Supportive resources	Yes
		Fear of competition	Yes
		Client demand	Yes
		Survival strategy	Yes
	Reaction forces	Partner's lack of interest	No
		Lack of staff commitment	No
		Inadequate firm capability	Yes
		Lack of financial resources	Yes
OUTCOMES OF RESPONSE TO COMPRESSED TIME DEMANDS (D)	Successful	Improved service to clients	Yes
		Efficient delivery of service	Yes
		Effective delivery of service	Yes
		Operational improvement	Yes
		Growth of the firm	No
		Satisfied staff	Yes
	Unsuccessful	Gained new insights	Yes
		Lost jobs from the client	No
ADVICE TO INDUSTRY (E)	Government policies	Start budgeting on time	No
		Use in-house professionals	No
		Be wary of in-house professionals	Yes
	Practice	Need to innovate to survive	Yes
		Use simple technology in-house	Yes
		Train staff to use technology	Yes
		Innovation can ensure growth	Yes

Summary of Interview 2

This firm do experience compressed time demands from clients on public sector projects regularly at the pre-contract stage. Compressed time demands are usually caused by the inability of the clients to plan well ahead of time and the intentional delays caused by in-house professionals. Due to the interest of both partners and staff in new ideas, this firm has been responding to the challenges of compressed time demands using some in-house innovative methods, which are less expensive but very effective. It is recommended that public sector projects should be planned on time and that CEOs of MDAs should be wary of the advice of in-house professionals. However QS firms should also be ready with innovative ideas on how to respond to the challenges of any compressed time demand whenever it occurs.

8.5.3 Cross-Interview Analysis

Table 8.11: Cross-Interview Analysis Result

HIGH LEVEL THEMES	MIDDLE LEVEL THEMES	LOW LEVEL THEMES	RESPONDENTS		
			1ST	2ND	Agree (A) / Disagree (D)
COMPRESSED TIME DEMANDS INFORMATION (A)	Do firms experience it?	Private projects	No	No	A
		Public projects	Yes	Yes	A
	When do they experience it?	Pre-contract stage	Yes	Yes	A
		Post-contract stage	No	Yes	D
		Commissioning stage	No	No	A
CAUSES OF COMPRESSED TIME DEMANDS (B)	Market pull	Client demand	Yes	Yes	A
		Competition	Yes	Yes	A
		Technology vendor demand	No	No	A
	Resource push	Financial availability	Yes	Yes	A
		Tacit knowledge demand	No	No	A
		Explicit knowledge demand	No	No	A
		Technology inadequacy	No	Yes	D
RESPONSE TO COMPRESSED TIME DEMANDS (C)	Innovative methods	Meets innovation definition	Yes	Yes	A
		Technological innovation	Yes	Yes	A
		Organisational capacity	No	No	A
	Action forces	Partner's drive	Yes	Yes	A
		Staff ownership of process	Yes	Yes	A
		Supportive resources	Yes	Yes	A
		Fear of competition	Yes	Yes	A
		Client demand	Yes	Yes	A
		Survival strategy	Yes	Yes	A
	Reaction forces	Partner's lack of interest	No	No	A
		Lack of staff commitment	No	No	A
		Inadequate firm capability	No	Yes	D
		Lack of financial resources	Yes	Yes	A
OUTCOMES OF RESPONSE TO COMPRESSED TIME DEMANDS (D)	Successful	Improved service to clients	Yes	Yes	A
		Efficient delivery of service	Yes	Yes	A
		Effective delivery of service	Yes	Yes	A
		Operational improvement	Yes	Yes	A
		Growth of the firm	No	No	A
		Satisfied staff	Yes	Yes	A
	Unsuccessful	Gained new insights	Yes	Yes	A
		Lost jobs from the client	Yes	No	D
ADVICE TO INDUSTRY (E)	Government policies	Start budgeting on time	Yes	No	D
		Use in-house professionals	Yes	No	D
		Be wary of in-house professionals	No	Yes	D
	Practice	Need to innovate to survive	Yes	Yes	A
		Use simple technology in-house	Yes	Yes	A
		Train staff to use technology	Yes	Yes	A
		Innovation can ensure growth	Yes	Yes	A

Summary of Cross-Interview Analysis

Both respondents agree that their firm experiences compressed time demands only on public projects and during the pre-contract stage. However, the second respondent confirms that the firm equally experiences compressed time demand during the post-contract stage. Also, both respondents agree that the causes of compressed time demands are client demands, the fear of competition and financial capacity. However, the second respondent believes that the inadequacy of existing technology is also a cause of compressed time demand. The responses of the firm to compressed time demands are by embracing technological innovation, which they see as a new idea, applied to improve the firm's operations. Partner's drive, staff ownership of process, supportive resources, and survival strategies are the action forces or the agents of innovation that help in responding to compressed time demand. Also, they contend that the lack of financial resources is a potent reaction force that suppresses the capacity to innovate. However, the second partner believes that inadequate capability of the firm is an additional reaction force.

The experiences of the firm in responding to compressed time demands through innovation bring about the benefits of improved services to clients, efficient delivery of services, effective delivery of services, operational improvements and a satisfied and motivated staff. Both respondents do agree that innovation does not necessarily bring about firm's growth. The few unsuccessful innovations were also useful as they provided a learning curve for the next set of innovations. Finally, while both respondents agree that a firm's survival is highly related to its innovation capability, they advise using simple in-house technology and training staff in the use of the technology. Consequently, they agree that innovation can enhance growth if that is the goal of the firm. They however differ in advising on government policies due to the different positions they hold on the impact of in-house professionals in compressed time demands. While the first respondent believes that government needs to rely more on in-house professionals to fill the gap created before external consultants are commissioned, the second respondent advices MDAs to be wary of advice from in-house professionals, which in most cases, are geared towards frustrating the procurement process.

8.6 Discussion

8.6.1 Discussion of Results

The discussions of the results from interviews and personal observations during the visits to the firm are kept under different subheading as shown below:

8.6.2 Aspects of Innovation Process

The discussions of results from interviews are structured with key subheadings so as to harmonise key issues under relevant focus according to the objectives of the study.

8.6.2.1 Understanding of the meaning of innovation

The understanding of the meaning of innovation is very central to this study. With little variation in individual perception, both respondents gave definitions of innovation as understood in the case study firm in ways that resonate with that of general literature. For instance, they define innovation in the professional QS firm as:

> a new idea that you can apply in an office that will ease your work……..…. innovation is a fresh idea that you use in the office to get a good result.
>
> (Respondent 1)

They also define innovation within the context of the firm's organisational structure as:

> coming with something new as a result of a present challenge that will help to overcome that challenge. It is a new idea, and when I say new, it does not mean that it has not existed somewhere but it has to be new at that particular time to that organisation.
>
> (Respondent 2)

The definition of innovation as understood in the firm enables the firm to confirm that it innovates mostly when faced with a challenge. Literature sees innovation as the generation and implementation of any idea which is new to the firm and which enhances overall organisational performance (Sexton and Barrett, 2003b). This seems to indicate the continuous movement from the status quo to a new improvement platform that is beneficial to the organisation. The lethargy in innovation experienced in many firms may therefore be occasioned by the absence of challenge if considered within the definition of innovation by the case study firm. So in practice, the challenge of compressed time demand in pre-contract documentation may be an enabler that provides opportunities for QS firms to innovate.

8.6.2.2 Innovation triggers/causes

Literature classifies the causes of innovation basically into market pull and resource push (Barrett *et al*. 2008; Sexton and Barrett 2003a; Sexton and Barrett 2003b). This study shows however that the major cause of innovation in the firm is when the firm is faced with a challenge to deliver to some very tight timescale of the clients, particularly, during the pre-contract documentation. The challenge or demand from the client is therefore the major trigger. This gives an indication that market pull forces cause a significant part of innovation experienced in this QS firms and perhaps to a larger extent in most QS firms in Nigeria. This is confirmed in the response of the firm to a question on how external challenges could trigger innovation:

> Yes, it does greatly. It is one of the drivers of innovation. By the time you have a challenge, you sit down and think about how you can approach it. Then you innovate. Remember I said innovation is a fresh idea that you use in the office to get a good result.

(Respondent 1)

This experience of the firm therefore agrees with literature and also with evidence from practice (see Figure 8.2: Model of Innovation Process) wherein it is established that innovation journey starts when there is a shock or stimulus in the external or internal environment in which the firm operates. There is no evidence to support resource push innovation initiated exclusively by the knowledge capital or financial capital in this firm hence, this may explain why the major innovation approach in the firm is radical rather than incremental (Slaughter, 1998).

8.6.2.3 Innovation Response

The case study firm states that it responds to compressed time demand during pre-contract documentation by using technological innovation. For instance, they contend that:

> When the client called, he wanted the job to be submitted in 6 weeks but we asked for 6 months. The client said either we take it or leave it. When the client insisted and we realised how important the job was to us we had to dig in. And of course we delivered.
>
> (Respondent 1)

On how this feat was performed they say:

> A staff of my firm had developed a spreadsheet model that helped to do this job in little or no time. By the time you are still working manually on the first bid, that spreadsheet would have completed the analysis of about three different bids. I take that as an innovation.
>
> (Respondent 1)

The development and use of in-house software appear to be the major way that this firm responds to any challenge of compressed time demands from their clients. However, the firm also engages in the extensive use of templates to support the use of in-house software applications.

> The other issue is that we have a template for writing a tender's report in our firm. As data is coming in, they are entered and processed automatically. Of course I have to give credit to my partner who is somebody with an eagle's eyes for innovation.
>
> (Respondent 1)

It appears that whenever the firm is faced with a challenge in practice due to the tight requirements of clients, the first port of call is technological innovation. Evidence of this is clearly demonstrated in the interviews when they, for instance, submit that:

> There was a time that we had to prepare a programme of work and schedule for a client. I was conversant with the Microsoft Project software and I used it for the project. That was a new idea that hastened the work.
>
> (Respondent 2)

This system of doing things resonates with literature on incremental innovation (Slaughter, 1998) and this signifies the fact that even though the firm engages majorly on radical innovation it also, though to a lesser extent, engages in incremental innovation. This agrees with Salge and Vera (2011, p. 157) where they refer to it as incremental learning which, "gradually refines and expands organisations knowledge base".

8.6.2.4 Innovation Outcome

The outcome of the responses to compressed time demand in the firm is first and foremost the urge to engage in technological innovation in addressing the challenge. Such innovation, according to the responding firm, brings about efficiency and effectiveness in service delivery to clients. This was alluded to in the result of a particular assignment from the client:

> We delivered and it was incidentally the best tender report that our firm ever written.
>
> (Respondent 1)

This was also explicitly expressed in the discussion of the reactions of the firm's clients after presentation of deliverables:

> We have made presentations in about four places where clients commend us for the deliverables for having done good jobs. We come out of these presentations feeling happy because we have done well. Our clients do feel satisfied. During a recent presentation, the CEO of a client organisation said, "you people have really helped me a great deal in getting this project to come to this level of seeing the light of the day".
>
> (Respondent 2)

The above comments agree with literature that for any action to be innovative, it must add value or bring about some improvements (Kimberly, 1981; Barrett *et al*. 2008; Sexton and Barrett 2003a; Sexton and Barrett 2003b).

8.6.2.5 Advice for policy and practice

A respondent sees compressed time demand as a situation brought about by a lack of appropriate planning in the client organisations and therefore recommends that:

> Clients should start on time and put in their thought on time and not at the dying minute. Client should also work with their in-house professionals. I notice that most times they do not consult or involve their in-house professionals.
>
> (Respondent 1)

Conversely though, another respondent advises the chief executive officers of client organisations to be wary of the advice given by in-house professionals because some may have intention of frustrating the project. He therefore argues that in-house professionals are part of the problem in most cases.

> Those of us in practice have come to realise that the in-house professionals of the client organisations don't really help matters because of certain personal interests that they may have. On one part it may happen that the consultant quantity surveyor appointed is not the one that the in-house professionals would have loved to do the job.
>
> (Respondent 2)

> Some of the in-house professionals see these jobs as what they could have done in-house but for which consultants are now being appointed. In a particular case, a highly placed officer and head of in-house professionals lamented that the agency has given all the jobs to consultants leaving all the in-house professionals with none of the jobs to handle.
>
> (Respondent 2)

He however gave a reason to support the appointments of external consultants, which he anchored on the level of experience that may be required for these projects, particularly the complicated ones.

> But the appointments of external consultants do happen because the in-house professionals lack capacity to perform judging by the comments of some chief executives.
>
> (Respondent 2)

Reconciling the advice of both respondents appears to be that while external consultants are desirable particularly on complex projects because of their experience, there are times when the in-house professionals should be used, particularly at the budgeting stage when the project has not been approved by government because the agency would be unwilling to commit itself to paying external consultants for abortive works. This could be inferred from the statement of a respondent who suggests that:

> Yes, the delayed budget affects the pre-contract procurement timelines but I have a different thinking. Probably if you want to do a job of N500,000,000, a solution could be the planning and preparation of documentation on time, keeping it and waiting for the "certificate of no-objection" and budget approval, which comes later in the year. MDAs can use in-house professional staff. Of course they also need external consultants even though they are always constrained in appointing consultants until BPP's approval.
>
> (Respondent 2)

An advice for practice is that QS firms should put in a lot of sacrifice to embrace innovation because innovative capacity of a firm affects its ability to win further jobs, survive and also grow. This is very explicit in the statement of a respondent:

> Any QS firm that is faced with the challenge of time should not just let it go. They should sacrifice the time. We once did a work, which was to take us 6 weeks in 24 hours. We let go of every other thing and concentrated on the job at hand. This office thrives best when we are put under pressure. Not that we like to be put under pressure but when we are constrained is when all our systems are tuned and focused for better result.
>
> (Respondent 2)

8.6.3 Key Considerations for Future Interviews

Finally, through personal observation during different visits to the firm and during the course of the interviews, the investigator observed the operations in the firm and the adequacy of the interview instrument and structure and made the following notes that could be very useful during the main doctoral investigations.

1. Due to the sensitivity of the investigation, which touches heavily on commercial and competition concerns, it may not be possible to obtain some data from the responding QS firm since the responding firm and the investigator's firm are potential competitors. This could affect the type of questions that could also be

asked during the interview and the extent to which the investigator can probe for a deeper answer. It may be necessary to exclude highly sensitive commercial questions. For example, a question seeking to know how the firm procures its jobs may sound very commercially sensitive. More of indirect questions may be asked and the respondent may decide to give deeper answers that may consequently provide more data for the doctoral work.

2. As a follow-up to the above concern, the responding QS firm may also be very reluctant in providing some archival records. This was experienced during this exploratory study. Promises to make some documents available for examination never materialised and this might have affected the ability to triangulate data from multiple sources of data collection instruments during the exploratory work.
3. A suggestion for addressing the above concerns may be to conduct a multi-methodological study for the doctoral research by introducing action research within the firm of the investigator whereby relevant data could be obtained freely to complement the interviews from multiple case studies and achieve a methodological triangulation. However, the use of action research depends on the availability of adequate time for such a longitudinal study.
4. In the main doctoral work, questions that require yes or no answers should be avoided because they may not add much value to the findings. Where a yes or no answer is unavoidable, a follow-up question, for example, "why yes/no" should naturally follow to engage the respondent from the depth of his/her experiences. The case study protocol and resulting questions for the doctoral work should therefore provide the platform for the respondent to provide deep narrative even within the context of a dialogue.
5. It is more likely that the cases may reach saturation with the first few interviews of the responding QS firms. This means that additional firms as research participants may not add any new thing of significance that has not already been expressed by the other previous firms. For this reason, the investigator has to keep the interview flow in view even though the plan is for six research participant QS firms.

8.6.4 Validation of the Innovation Process Model

For the purpose of validation, the innovation process model in Figure 8.2 (p. 134) can easily be divided into the following four sections for easy analyses and discussions:

1. Shocks/Stimulus on the steady state; from point 0 to point 2

2. Optional trajectories; from point 2 to point 5
3. Action and reaction forces; from point 5 to point 8
4. Resultant steady state; from point 8 upwards.

8.6.4.1 Shocks/Stimulus on the Steady State

Both literature and the innovation process model contend that organisations are averse to change and tend to, as much as possible, maintain the status quo which Bessant, *et al*. (2005) call "relative stability". This relative stability state is referred to as the steady state as shown on the X-axis of the innovation process model in Figure 8.2. However, Pugh (1993) affirms the inevitability of change because organisations are organic in nature while Kast and Rosenzweig (1985) see these changes as originating from both internal and external environments. According to Lewin (1943, 1958), these changes unfreeze the steady state by changing the forces that maintain the steady state. The innovation process model represents this change as shock or stimulus and shows how it disrupts the steady state having been challenged by such external and internal forces.

The exploratory firm appears to concur with the assertion of the innovation model in its operations. For instance, a respondent keeps referring to being put into action by *challenge*. Challenge can only occur when there is a status quo, otherwise called the steady state that is being challenged. The respondent therefore says this of challenge:

> It is one of the drivers of innovation. By the time you have a challenge, you sit down and think about how you can approach it. You then innovate.
>
> (Respondent 1)

This is echoed by the other respondent who says that:

> I will define innovation as coming with something new as a result of a present challenge. It is a new idea and when I say new, it does not mean that it has not existed somewhere but it has to be new at that particular time to that organisation.
>
> (Respondent 2)

> What we do, like I said, permit me to go back to the definition I gave of innovation as using idea that is new to the firm and not just an idea new to the world. You can get this idea from somewhere but it should be new to your firm, you can then use it to overcome your present challenge. As a typical example, there was a time that we had to prepare a programme of

> work and schedule for a client. I was conversant with the Microsoft Project software and I used it for the project. That was a new idea that hastened the work.
>
> (Respondent 2)

It could therefore be concluded that the exploratory firm, through its experience, agrees with the proposition of the innovation process model to the effect that innovation occurs as a disruption to a steady state in a firm through shocks or stimuli. The exploratory firm has experienced it exactly the same way while describing those shocks and stimuli as corruption, indecision of clients and delays. A respondent also put these together as:

> The first reason is corruption. The second reason is the indecision of government.
>
> (Respondent 1)

8.6.4.2 Optional Trajectories

The offset caused by the shocks or stimulus creates a problem. Problems according to Ackoff (1981) have three characteristics. There must be alternative courses of action that could be taken on it; any of such action taken on the situation must have the potential of having serious consequences; and there must exist doubt on which alternative action to be taken. Van de Ven *et al.* (2005, p. ix) opine that during innovation, the manager "needs a *road map* that explains how and why the innovation journey unfolds and what path are likely to lead to success or failure" even though Bessant *et al.* (2005) affirm the absence of any guaranteed formula for success when considered alongside the postulations of Ackoff (1981) on problem identification. The innovation process model represents these options as A, B, C, D and E from point 2 to points 4 and 5 as shown on Figure 8.2 (p. 134)

The exploratory firm indicates that it uses different options to address the problem caused by the shock/stimulus during the pre-contract documentation depending on the type and nature of the project. In an instance, a respondent says:

> Yes, at the background we had people working, and we had firm-made software to support them. Different people concentrated on different aspects of the job and as data are becoming available, they are input into the system for processing.
>
> (Respondent 1)

In another instance the same respondent says:

> We use our own office developed small-scale applications. We once tried to use the one developed in Nigeria by one of the big IT/QS firms but it didn't give us what we wanted so we have not used it again since then.
>
> (Respondent 1)

He also recalls the experience with another option wherein the firm deployed additional resources to get the job done:

> We once did a job, which was to take us 6 weeks in 24 hours. We let go of every other thing and concentrated on the job at hand.
>
> (Respondent 1)

On deploying additional resources, like human resource, as an optional path when confronted with shock or stimulus, another respondent gave the impression that this approach may not suffice in every situation as a better innovative approach may be needed in subsequent situations.

> At that time, I believe that the approach we used was just the best we could do to deliver. But I believe that it might not stand the test of time again.
>
> (Respondent 2)

In summary, there appears to be a close agreement of the exploratory firm's experiences with the proposition of the innovation process model to the effect that after a shock or stimulus, different optional paths to take in resolving the problem are available. However, it is left for the firm to follow the most appropriate and innovative path depending on the particular project and situation.

8.6.4.3 Action and Reaction Forces

Lewin (1943, 1958) deal extensively with the field theory and force field analysis. He contends that there are forces that maintain every situation or position and that the need to change such situation will require changing those forces that keep it in place. These sets of opposing forces are the external and internal action and reaction forces, which are clearly represented in the innovation process model and working against each other under fluid participation of organisational personnel, technical challenges and advantages and, finance controller/top management actions. While the driving forces are the forces of change trying

to move the organisation to a new state, the restraining forces are the forces that resist the change and seek to maintain the status quo.

Empirical details from the exploratory firm show that it agrees with the proposition of the innovation process model about the operations of the action and reaction forces as it concerns the participation of personnel, technical challenges and financial/top management decision. On the fluid participation of the firm's personnel, a respondent says:

> I would not say that there is any particular person that is the driver of innovation. This usually comes as the jobs confront us. It could even be the staff that has a new idea on how something should be done. We do check it out and jointly look at it together. So, every one of us is a driver but what we do is to encourage such innovation.
>
> (Respondent 2)

On the technical challenges posed in learning new software, both respondents recognise the presence of action and reaction forces. Looking at the technical challenges and the high cost of software, a respondent says:

> The problem we had with those bespoke software, particularly the one developed in accordance with the BESMM was that it measures well but prints out poorly. However, I understand that the developers have addressed that challenge. We have not tried QSCAD and MasterBill because they are too expensive.
>
> (Respondent 1)

However, another respondent is of the view that those challenges could be surmounted through dedication of staff and support of top management:

> I think it is a personality issue if you give yourself to it. Acquiring technical knowledge involves giving time to it…people should have the ability to get knowledge from books and how other people do it.
>
> (Respondent 2)

8.6.4.4 Resultant Steady State

The resultant steady state is the *refreeze* segment of the 3-Step change model of Kurt Lewin. It shows the outcome of the innovation exercise and determines whether it was successful or not. For innovation to be successful it must have a value addition whether tangible or intangible. (Kimberly, 1981; Capaldo *et al.,* 1997; Barrett *et al.,* 2008). This is

shown from point 8 upwards on the innovation process model as the new steady state on the X-axis on Figure 8.2 (p. 134). The value addition is represented by the difference between Level 3 and Level 1 on the Y-axis.

The proposition of the innovation model is that the innovation process of every successful innovation should result into value addition. Evidences of these are readily available in the exploratory firm's experience through the innovation process. A respondent alluded to this when he states that on a tender report:

> We collected the document around 1:00 pm and the client wanted the report by 10:00 am the following day. There were 20 contractors' tenders to be analysed and report prepared before 10:00 am the following day. When we said it was not possible, he threatened to call another consultant quantity surveyor to do it. We delivered, and it was incidentally the best tender report that our firm ever written.
>
> (Respondent 1)

In the experience of another respondent, there are clear instances of successful outcomes that have brought added value to the firm:

> We have made presentations in about four places where clients commend us for the deliverables and for having done good jobs. We come out of these presentations very happy because we have done well. Our clients do feel satisfied. During a recent presentation, the CEO of the client organisation said, "you people have really helped me a great deal in getting this project to come to this level of seeing the light of the day".
>
> (Respondent 2)

8.6.4.5 Conclusion

In conclusion, the above discussions on the four critical components of the innovation process model: shocks/stimuli on initial steady state, optional trajectories, action and reaction forces and, resultant steady state, were meant to validate the model at this stage using the empirical data from the exploratory case study. The discussions show that shocks/stimuli on the initial steady state happen in the exploratory case study in similar ways as proposed in the innovation process model. Empirical data from the exploratory case study also confirm that shocks/stimuli consequently throw-up optional paths for resolving the problems and that the firm would have to choose from the various options depending on the nature of the problem. This sits perfectly well with the optional trajectories proposition of the innovation process model.

The plethora of action and reaction forces from both the internal and external environment could be grouped under three main areas: fluid participation of organisational personnel, technical challenges and advantages and, finance/top management buy-in. Empirical evidences from the exploratory case study show that personnel are allowed to fully participate in the innovation process irrespective of their views, technical challenges are resolved through training and research and there is full top management buy-in for all innovation within the firm. Finally, when this process is followed in the exploratory firm, there are evidences of both tangible and intangible value addition in the form of a happy client, a fulfilled consulting firm occasioned by timely and cost efficient delivery of pre-contract documentation services. In effect, the innovation process model is validated through the empirical data from the exploratory case study.

8.7 Conclusion and Recommendation of the Exploratory Study.

8.7.1 Conclusion

This exploratory study was initiated to understand how a QS firm in the Nigerian construction industry uses innovative methods in responding to the specific challenge of compressed time demands during pre-contract documentation and consequently to firm up the larger doctoral study. Subsequently, the key objectives are:

1. To review existing literature on innovation in QS firms.
2. To review the practice background and research context of innovation in pre-contract documentation in QS firms in Nigeria.
3. To explore how a QS firm uses innovation in responding to compressed time demands for pre-contract documentation in Nigeria.
4. To analyse the major factors at play in innovation in a QS firm.
5. To assess appropriate research methodologies to study this type of phenomenon in relation to the adequacy of the data collection tools in preparation for the doctoral research.
6. To firm up the study and provide recommendations for action towards the larger doctoral study.

The exploratory study has addressed all the six objectives set out and the conclusions are presented in this final section. Objectives 1 and 2 were addressed in Chapters 1, 3, 4 and 5 while objectives 3 and 4 were addressed in Chapter 8. Objective 5 was addressed in Chapter 6 while objective 6 was addressed in Chapter 8. The following section presents the conclusions in line with the aim and objectives of the study.

8.7.1.1 Literature Review of Innovation

The main aim of innovation is for organisational improvement. So, when a new idea is generated and implemented in a way that the process or product of the organisation is improved, innovation is said to have occurred. Firms are eternally searching for new ways of fulfilling their key goals of efficient and effective service to the market place, satisfaction of organisational staff and procurement of adequate profitability for its owners. Innovation offers a way of getting these goals achieved.

Various models and theories of innovation are available to help the firm classify, understand and derive maximum benefits from its innovative activities. While the generic innovation model (see Figure 3.3, p. 48) is used to identify the key success factors of innovation as appropriate focus that is responsive to contextual factors and realised through appropriate organisational capabilities (Barrett *et al.,* 2008); knowledge-based innovation model (see Figure 3.4, p. 50) expands the discourse on organisational capabilities by advocating for knowledge capital which can be achieved through relationship capital, structure capital and human capital (Sexton and Lu, 2012). The magnitude and link model (see Figure 3.2, p. 45) characterised innovation according to its magnitude of change and link to other components or systems (Slaughter, 1998). This shows that while incremental innovation is a small change within existing organisational system, radical innovation is a major change that discards existing organisational system.

The innovation journey has therefore been classified in a composite process model (see Figure 8.2, p. 134) as a system of continuous interactions between the action and reaction forces within both internal and external environments. The successful innovation journey is that which adds value as indicated in Figure 8.2 while the unsuccessful innovation journey is referred to as mistakes.

Innovation literature in small professional service firms needs special consideration and more research because most of the existing literatures concentrate on the large firms, the manufacturing firms and, the non project-based firms. There is therefore a gap in knowledge in how QS firms innovate within the Nigerian construction industry. Deepening knowledge on how the professional service firms innovate is desirable and any study, which seeks to explore innovative response of QS firms to compressed time demands during contract documentation in the Nigerian construction industry, appears to be timely and appropriate.

There is ample literature confirming that valid knowledge could be generated in practice. For instance, the views of Polanyi (1966), Schon (1991) and Nimkulrat *et al.* (2015) show that we know more than we can express and that there is knowledge-in-action or experiential knowledge, which is integral to professional practice. However, literature reviewed is short on theoretical models on how practice knowledge could be obtained and presented in ways that are acceptable to the academy particularly in the built environment. The onus is therefore on the main doctoral work to develop a theoretical model for practice-based research in the built environment.

8.7.1.2 Practice Background of Innovation

Evidence shows that the major employer of construction projects in Nigeria is the public sector while the private sector trails behind. The public sector globally is generally known for its bureaucracy and this is perhaps the reason why many initiatives like the public private partnership model of infrastructure delivery is being proposed globally as a way of improving the efficiency and effectiveness in the delivery of projects. However, as much as the public sector still dominate construction procurement, the operating space or practice environment of the professional service firms will continue to be determined by the whims and caprices of the bureaucratic cloud.

Public projects in Nigeria are victims of the political interplay of seemingly unending budgetary processes (see Tables 1.1 and 1.2, pp. 11 and 12 respectively). Within the confines of the limited operational space therefore, the QS firm may need to embrace innovative ideas and technology to be able to survive and perhaps grow. The need to develop innovative strategies in responding to compressed time demand during pre-

contract documentation is clear and has to be taken seriously within the murky waters of construction procurement in Nigeria.

8.7.1.3 Exploring Innovative Method in Responding to Compressed Time Demand

The empirical study conducted shows that there is synergy between the literature and practice on the meaning and understanding of innovation and on the impact it plays in the survival of firms generally and QS firms in particular. The respondent firm in the exploratory study agrees that most of their commissions were affected by compressed time demands from the client not only because the bulk of such commissions come from the public sector with its bureaucratic undertones but because there is a systemic failure on the part of public sector to plan appropriately for its construction projects.

The firm has responded to compressed time demand through the use of innovative approaches. This includes the use of a gamut of application software but with preference for the in-house developed task-specific software. The key issue here is that these applications are developed in-house and therefore have the immediate advantage of ownership and flexibility in use within the firm. The few incursions into bespoke off-the-shelve application software have not yielded the desired result but this could not be generalised in a single case experiment. Even though there is a school of thought that believes that resource push innovations that leverages on its knowledge capital is central to any innovation initiative, this case study argues and concludes that the major trigger of innovation in the firm is the market place. Therefore, innovation in the respondent firm is mainly market pull.

8.7.1.4 Key Factors at Play in Innovation

The case study also agrees with literature that the major factors at play in technological innovation are essentially the action and reaction forces that drive or constrain the intention and ability to innovate. Figure 8.2 (p. 134) graphically displays these factors and shows the direction of their respective impacts. These forces include, client demand, market requirements, competition, organisational capability, financial resources, knowledge capital and, organisational culture - all providing a complex interplay within the internal and external environments. However, further studies are required to demonstrate the effects of the interplay of each action or reaction force and the resultant effect of the

cumulative efforts of the forces, which determines the value added or value destroyed in any innovation undertaken.

8.7.1.5 Appropriate Research Methodologies

It has been argued partly in Chapter 6 that the appropriate research methodology for this study is qualitative using a case study approach. Hence, this study has been carried out on the same premise. However, in the course of the empirical part of the study it became obvious that there were some limitations in the absolute reliance on the case study approach due to the sensitivity, commercial and competitive characteristics of the investigation, which may partially constrain the ability of the case study to have deep-seated answers to some very important questions. It has therefore been suggested that in the main doctoral investigation, a multi-methodological approach may be engaged which incorporates action research with case study to ensure appropriate methodological and data triangulation.

8.7.2 Contributions to Policy and Practice

The major contribution of this study to policy is in the area of planning. This study has demonstrated the need for public agencies to plan their projects well ahead of time to prevent the annual ritual of demanding tight timelines from consultants. Rather than blaming lawmakers for the late passage of budgets, agencies should rather plan ahead making reasonable allowances for the delays occasioned by political debates and budgetary approval process. Abandoned and uncompleted projects are caused by the lack of planning hence if the recommendation of this study is imbibed, the sorry stories of abandoned projects in Nigeria could be a thing of the past. Also, in-house professionals should be used to advice on public procurement at the early stages when public agencies are unwilling to commit to paying consultants' fees before budget approval.

The contribution of this study to practice is that firms should embrace innovation, not on an ad hoc basis, as is presently done, but as a deliberate strategic action plan. This is a reliable way of meeting client demands of effectiveness and efficiency. For QS firms to survive they must innovate in the delivery of professional services to clients.

8.7.3 Recommendations for the Main Doctoral Research

This exploratory study has the following implications for the main doctoral research:

1. Because of the sensitivity of this study and the presence of the element of competition, there is need to review the approach to interview in order to get deep-seated responses from respondents. There is also the need to allay the fears of respondents about the presence of any competitive undertones.
2. A multi-methodological approach may be a more appropriate methodology if this research should be taken to a larger scale. It is suggested that action research may be combined with case study to complement case study's ability in addressing the limitations of interview as a data collection instrument.
3. The amount of data to be analysed in a case study involving 5 or 6 firms may not be that large as to warrant the use of Computer Assisted Qualitative Data Analysis Software (CAQDAS) like NVivo 11. However, the use of NVivo 11 may provide added advantage to data analysis.
4. There are ample literatures that discuss how valid knowledge could be generated in practice. However, literature reviewed is short on practice-based theoretical models on how practice knowledge could be created and presented in a way that is acceptable to the academy particularly in the built environment. It is proposed that the main doctoral work could develop a theoretical model for practice-based research in the built environment.

8.8 Summary

This chapter covers the exploratory work and presents a graphical innovation process model, which integrates the key components of all the previous models and an explicit representation of the action and reaction forces as they relate to each type of innovation. It presents tabular and structural details of how template themes emerged as a framework for presenting and comparing the results in a Template Analysis Technique.

The results and summaries of the interviews conducted with the two respondents and situations observed in a single case study and the presentation are made using the template of the themes that were developed from literature and practice from the previous chapters. A cross-interview analysis and summary of the two interviews were done thereby aligning the discussions from literature and practice with the empirical data towards addressing the

aim and objectives of this study. Finally, the innovation process model is validated using empirical data from the exploratory work.

Through different subheadings, this chapter discusses the findings of this study under: understanding of the meaning of innovation, innovation triggers/causes, innovation response, innovation outcome, advice for policy and practice and advice for the main doctoral work.

CHAPTER NINE

9.0 RESULTS AND FINDINGS

9.1 Introduction

This chapter covers the results and findings of the main study in six exemplary case studies of quantity surveying (QS) practice firms, which represent the units of analysis of the study. The case study protocol (Appendix C, p. 296) and the case study interview template (Appendix D, p. 298) for this main study are applied uniformly across all the respondent firms. As a recap, how the final template is developed from the results of the exploratory study conducted in Chapter 8 is presented. Following this, the results and findings of the six exemplary case studies are presented.

9.1.1 Recommendations from Exploratory Study

The key recommendations arising from the exploratory study and which feed into the main study are that:

1. The feasibility of the research is confirmed through the results and findings of the exploratory study.
2. There is need to be cautious of sensitive commercial questions as it could easily be construed as the antics of a competitor rather than a genuine question from a researcher.
3. Doing a multi-methodological study whereby case study of exemplary firms are combined with action research of the investigator's firm may address the situation in point No 2 above. However, available time is very short for such a longitudinal action research to be conducted. Hence, actions research may not be carried out in this main study.
4. Experience from coding indicates that the coding template which divided the themes into three levels (high level, middle level and low level) may have been too detailed and not necessarily adding any value to the analysis. It should therefore be adequate to classify themes into two levels only (high level and low level) in the main study.
5. There is need to restructure the *a priori* themes and template so that the themes could be more reflective of the data. These changes are discussed in section 9.1.2

6. The use of Computer Assisted Qualitative Data Analysis Software (CAQDAS) may be desirable due to the large amount of data to be generated. Hence, NVivo 11 is used for the analysis of data in the main study.

9.1.2 The Final Themes and Template

The summary of *a priori* high-level themes developed from literature for the template analysis of the exploratory study and shown on Tables 8.2-8.8 (pp. 137-142) comprise the following:

1. Information on the occurrence of compressed time demands
2. Causes of compressed time demands
3. Response to compressed time demands
4. Outcome of responses to compressed time demands
5. Advice for policy and practice
6. Methodology for investigating compressed time demands

The exploratory study confirms that *a priori* themes 1-3 stated above are still very relevant and should be maintained in the main study because, at this stage, the key issues are about compressed time demands as there are no definitive assurances of whether the pendulum will swing to innovation or not. However, there is need for more clarity and relevance when it comes to *a priori* theme 4. There is evidence from the exploratory study of a possible innovative method. Therefore, the outcome of the exploratory study suggests that *a priori* theme 4 should be divided into two separate high-level themes to take care of *Innovation Challenges* and *Innovation Outcomes* in line with the objectives of the main study. This will make the themes more reflective of and responsive to the data.

A priori theme 5, advice to policy and practice, is very relevant to the objectives of the main study and should therefore be maintained. The issue of methodology of investigation as shown in *a priori* theme 6 has been settled under the literature and exploratory study. It was concluded that since methodology was not part of the case study interview questions, documents, archival records and personal observation data, it may therefore not be needed at the analysis stage. Methodology ends with literature and is therefore not required for further discussion or inclusion at this stage. A new theme, *Pre-contract Documentation*, is however created to understand the level of importance placed on the preparation of contract documents for it to meet the required quality and time in achieving an effective

and efficient project delivery. Another new theme, *Types of Innovation,* is equally created to understand the different types of innovation in a QS professional practice. The final template for high level and low-level themes for the main study is as shown on Table 9.1 while the structure is shown on Figure 9.1.

Table 9.1: Template of Final Themes for Innovation in Compressed Timelines

ITEM	HIGH LEVEL THEMES	LOW LEVEL THEMES
1	PRE-CONTRACT DOCUMENTATION	Highly important
		Not so important
2	INFORMATION ON COMPRESSED TIME DEMAND	Is it experienced?
		When is it experienced?
3	CAUSES OF COMPRESSED TIME DEMANDS	External factors
		Internal factors
4	RESPONSES TO COMPRESSED TIME DEMANDS	Innovative methods
		Other methods
5	TYPES OF INNOVATION	Market pull
		Resource push
6	INNOVATION CHALLENGES	Action forces
		Reaction forces
7	INNOVATION OUTCOME	Successful
		Unsuccessful
8	ADVICE TO INDUSTRY	To clients
		To practice

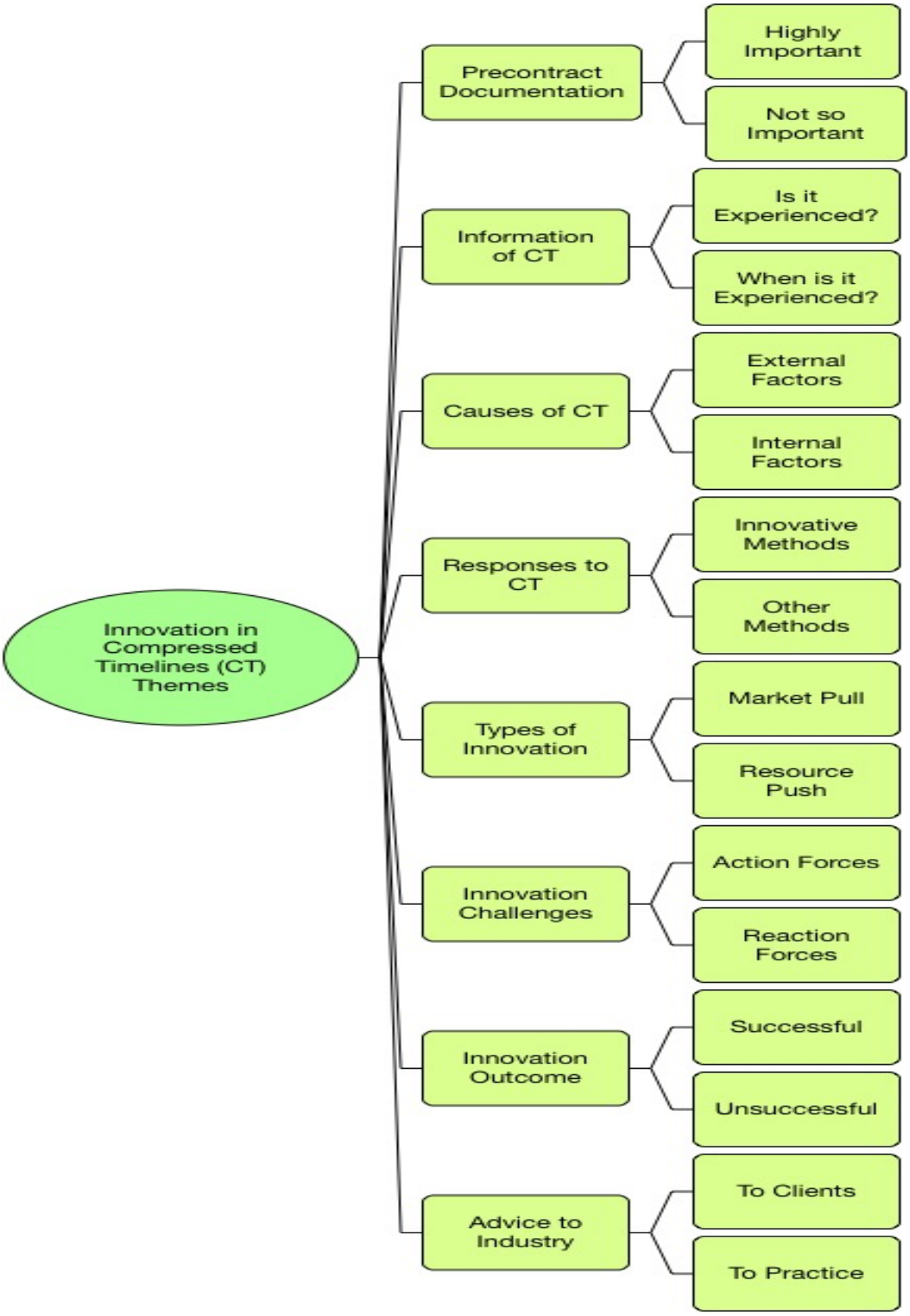


Figure 9.1: Structure of the Themes for Innovation in Compressed Timelines

9.2 Case Study 1: Firm A

The results of the Case Study 1 interviews, documents and personal observation are presented and structured thematically according to the final themes from Table 9.1

9.2.1 Interview 1

Introduction

This firm was established in 1980 and registered by the NIQS and QSRBN to carry out professional quantity surveying consultancy functions. Most of its clients are in the public sector of government ministries, departments and agencies. The firm provides cost management and quantity surveying consultancy services within the building construction sector complete with the cost management of all types of mechanical and electrical services engineering. The interview showed that the organisational structure of the firm is flat and horizontal and this has helped its ability to innovate, generate new ideas and take immediate actions as necessary. Any staff of the firm is able to easily discuss critical ideas and take appropriate actions without the effects of the crippling officialdom of hierarchy. However, the document provided showing the organogram of the firm shows a hierarchical command structure, which is at variance with the data gathered from the interview and personal observation. This seems to indicate that perhaps, the firm has not taken much time to review its documents to reflect its actual organisational structure.

Pre-contract Documentation

The firm recognises that due to the fact that complexities of buildings are increasing by the day, there is increasing need for clients to get experts in contract documentation to prepare the contract documents (drawings, specifications and bills of quantities) in ways that the intention of the client would be very well understood by all interested tenderers. In this way, competitive prices could be obtained from these tenderers and the adversarial tendencies that could arise during post-contract practice significantly minimised. The experience of this firm shows that the QS, amongst the team of consultants, is the last to receive client's brief and other information represented on the drawings. Therefore, there is more pressure on the QS than other consultants to produce the contract documents, like the bills of quantities, within very short duration. For this reason, the firm gets itself very

prepared to meeting these challenges through innovation of its product and processes. The conclusion is that the pre-contract documentation process is very important to the successful delivery of construction projects.

> Buildings are getting very expensive, even small buildings, and it is more the case with the big ones except where the client has limitless funding. You want to know how much the project you are going to have will cost you *ab initio*. And that helps you prepare yourself for the funding.
>
> (Firm A)

Information on Compressed Time Demands

From the experience of the firm, it is obvious that the QS is usually the last of the consultants to receive necessary data for the preparation of pre-contract documents. This therefore puts a lot of pressure on the QS to work within very tight timelines and cause compressed time demands and its associated problems. The demand for compressed time is so pervasive that it happens on all projects handled by this firm without any exception.

> We have always known, as quantity surveyors, that we are the final set of consultants to receive documentation for the production of contract documents. And the pressure comes heavily on us to meet the finishing deadline.
>
> (Firm A)

Causes of Compressed Time Demands

The firm has experienced compressed time demands on virtually all its projects. Firm A therefore sees the major reason for delays in project commencement and execution as the effects of the culture in Nigeria of always waiting till the last moment before taking action. What could be done on time is always left undone until the time is almost over. This is popularly called the *fire-brigade* approach and it puts people under unnecessary tensions, which could result into poor quality project delivery. Equally important is the delay in budget appropriation by the National Assembly. Budget appropriation bills in Nigeria are not passed into law until about half of the appropriation year is gone. This reduces the time available for project execution and provides the platform for compressed timelines in project delivery. Furthermore, the process of briefing is problematic and inadequate thereby causing problems for the design team in understanding client's intentions. Problems in understanding client's intention also cause delays in project delivery. Also, other consultants' inability to make available, on schedule, all the necessary drawings do

have significant effects on project delivery. When other consultants deliver drawings to the quantity surveyor late, this could seriously affect the ability of the quantity surveyor to prepare and present the bills of quantities on time. Compressed timelines impinge on the project timeline and consequently project cost. As buildings are becoming more expensive, it is important that the client gets to know the financial implications of the project on time.

> I think it is the cultures of the way a lot of these organisations operate. Like in the core ministries for example, it is when the budget year is going to an end that they realise that they have left something undone and they want to get it done within the budget year.
>
> (Firm A)

> I'll tell you that the briefing process is a problematic aspect of project procurement. A lot of time the briefing is inadequate and it then leaves the lead consultant, the architect in this case, to assume what he thinks the client wants. With some clients, that may not be the case, and it leads to conflicts and it may lead to the revision of the drawings later on, very high cost and time impacts.
>
> (Firm A)

> Inputs from other consultants definitely encroach on the allocation of time for quantity surveyors to deliver. You need to manage that aspect. Like I told you, when you are constantly involved in projects, there are certain expectations you have from the other consultants.
>
> (Firm A)

Responses to Compressed Time Demands

This firm responds to the compressed timelines through a plethora of initiatives. Firstly, the flat organisation structure operated by the firm assists the firm in making quick and strategic decisions when needed most without waiting for ages as is applicable in hierarchical organisation structure. Even though there appears to be a difference between the claim to flat organisational structure in interview and personal observation on the one hand and the organogram on the other, this could be resolved in favour of flat organisation because its operation was personally witnessed during the interview. The firm's flat organisation structure therefore creates an open environment that allows the freely sharing and cross-fertilisation of ideas within the firm. This organisational structure was designed to specifically respond to the nature and culture of project conception and delivery in Nigeria. Secondly, the firm developed the tactics of elemental preparation of bills of quantities with each staff concentrating on an element of the project at a time. This has helped greatly in reducing the time for bill of quantities preparation and consequently pre-

contract documentation. Thirdly, the firm uses extensive application of information and communication technology (ICT). The firm deploys modern computer systems with the latest application software (CATO Pro) obtained from Causeway Ltd in the UK. This enabled the firm to dispense with all printed drawings since 1997. This innovation has helped in no small measure to getting bills of quantities prepared on time. They now use the application software to take-off quantities straight from the soft copies of the drawings and this has saved a lot of time and improved the firm's ability to respond to changes in design proposals. The firm is now planning to engage with BIM and has commenced the training of its staff on this. This is a new innovation that has great potentials to further improve the ability of the firm to face the challenges of compressed timelines.

> We are well structured on how to respond to the production of the bills of quantities. Like I earlier said, we produce the bills in elemental system whereby we have people who are well honed to measure certain aspects of the building. And once they are done we assemble our projects.
>
> (Firm A)

> In the digital age, I don't think you can work efficiently or effectively without imbibing the use of the current technology. We have been into using current technology in production of documentation for a very long time.
>
> (Firm A)

> We are now getting our drawings from the soft form (CAD or Revit) and we measure from there. We have actually now moved to BIM. Some of our staff went to England for some training on BIM and we are at the learning stage. We hope that by the end of this year we'll be there and ready.
>
> (Firm A)

Types of Innovation

The firm agrees that innovation could either be market-pull or resource-push but that they are not mutually exclusive since one complements the other. Market-pull innovation is caused by factors like client's demand for consultants to deliver pre-contract documents within compressed timelines. When this pressure is high, consultants are forced to innovate in order to meet up. Resource-push innovation happens when the firm, due to its financial and human resource determines to innovate to improve its operations. It may be because it has the financial power or that the human resource is always very interested in doing things differently. Either way, the firm believes that the need for resource push innovation will only come up if the market is buoyant. Also, even though there may be the market demand to innovate for example to the use of latest software to perform a certain task, without the

financial support or the interest of the human resource interested in using the software, it may be difficult to respond to such market demands.

> They are not mutually exclusive. They are interdependent. Without the buoyancy of the market the need for the resource-push will not be there. The market has to be there first and when you have sufficient resources you'll be able to foresee the demands of the market and respond to it. Without resources, you may even identify the needs of the market but you don't have the resources to push it. So, that's why I said they are interdependent and not mutually exclusive.
>
> (Firm A)

> When there is sufficient resource from within, of course you continue to look for easier ways of getting things done. And in the process, if the market is ready, you find yourself responding to it very quickly
>
> (Firm A)

Innovation Challenges

The firm notes that it is extremely difficult to work without using latest technology. The pressures of compressed time demands would require the need to innovate either the process of delivery or the deliverables. There are however a series of action and reaction forces that support or restrain innovation in a firm. These include the ability of the personnel to accept new ways of working, the technical challenges of learning to use new software and the sometimes very high cost of procuring ICT facilities which is more prevalent in less developed countries.

> In the digital age, I don't think you can work efficiently or effectively without imbibing the use of the current technology. We have been into using current technology in production of documentation for a very long time.
>
> (Firm A)

Innovation Outcome

Although the firm sees these initiatives as ways of managing projects so as to deliver on time and remain competitive, it however agrees that having met the definition of innovation, that is, being new ideas in the firm that are applied and that bring about benefits, these new ideas could be termed innovation. The applications of the various initiatives have enabled the firm to be able to considerably reduce the pre-contract timelines but there is still much to be done to eliminate compressed timelines. However,

the experience of the firm in innovation during past projects could be taken as very successful. This has made the firm to embrace BIM to further improve the ability to deliver the pre-contract documents on time. The problem with BIM however is that other consultants like the architect and the engineer are yet to imbibe the BIM culture in the Nigerian construction industry.

> Well, we prepare the bills of quantities and other contract documents. We are well structured on how to respond to the production of the bills of quantities. Like I earlier said, we produce the bills in elemental system whereby we have people who are well honed to measure certain aspects of the building. And once they are done we assemble our projects.
>
> (Firm A)

> We know that after all the investments in time and efforts, we can pick up some good rest afterwards. So we are encouraged and motivated to put in as much time as we could to get it to a successful finish so that we can take a rest after it
>
> (Firm A)

Advice to Industry

On the part of the clients, there is need for them to be able to provide clear, meaningful and understandable briefs. More organisations are now engaging construction professionals as in-house professionals to help in preparing realistic briefs. This should be encouraged in all client organisations. The budgeting process is still a problem and the client could do very little to speed up the budgeting process as the power to do this still lie with the legislators. Also designers should be able to factor the timing for the quantity surveyor to prepare the bills of quantities into their programme. The present situation whereby the quantity surveyor is left with no time to prepare the bills of quantities is counter-productive. All the consultants should engage in BIM so as to have information made available to all consultants in real time. Firm A advises QS firms to engage in innovation not only because it boosts productivity but because it allows the quantity surveyor more time to concentrate on the core cost management duties while procedural functions are performed through information technology. This would be made possible if the top management of quantity surveying firms should develop innovative mind-sets and own the innovation process. Finally, every QS firm should see itself as a research organisation that takes note of challenges during compressed timelines and researched about what to do to resolve the challenges when the workload is less. In this way there will be continuous improvement in

the way projects are delivered generally. Innovation therefore supports continuous improvement.

> The briefing process is extremely important to project success and that is when the client clearly defines the objectives of the project. When that is well defined and all the requirements captured by the architect, allocation of spaces for the various functions clearly made, then it is very unlikely that in the cost and duration of the project there will be lots of variations. But in a situation where the briefing process is flawed, either due to inexperience of the client organisation, the architect will take it upon himself to interpret what he thinks, but it may not fit into what the client really wants until the building has commenced. And these spaces become obvious and that will lead to changes and time elongation
>
> (Firm A)

> So, a QS firm just takes on a new discovery and it requires courage to do because people always want to do their things the way they are used to and you must, like you once said, have an innovative mind to take on something that you are not sure will work but it turns out to work.
>
> (Firm A)

> Firms should not be afraid to go to an uncharted land. And if the world had stayed on the safe ground all along, progress would have been stranded
>
> (Firm A)

9.2.2 Interview 2

Introduction

The firm was established about 35 years ago to offer QS services to both private and public sector clients. The firm is registered by both the NIQS and QSRBN. The activities of the firm are quantity surveying, cost management, contract administration and tender documentation to both public and private sector clients. The firm has the capacity to provide many services to clients but the particular service(s) being provided is usually dictated by the demands of the market. However patronages in the market is skewed towards QS services. About 97% of its commissions are in the public sector while the private sector is a paltry 3%.

Pre-contract Documentation

The firm views the pre-contract documents as very important because if they are not done correctly, the contract gets into problems. Very few clients know what they want so, many

clients require the consultants to produce the required documents that translate client's intention into documents that could be understood and priced by tenderers. These documents are therefore very important if the project is to be successful. Pre-contract documentation however has to start very early in the project when the client brief is received or being prepared. When the QS is involved at this early stage, it enables the preparation of quality pre-contract documents which become essential tools in post-contract administration.

> Of course, they are very important because if you miss it then the contract runs into problems. If there are errors or things not done properly definitely it hurts the next stage of the project.
>
> (Firm A)

> I have seen that happen where the architect has been engaged, a lot of efforts and designs have gone in and when presentations were made and everybody is happy with the excitement of the design they have, then the QS comes in and does his estimate and the estimate bursts the whole bubble. Then questions start to being asked like, do we really need this or that or would it help our business to spend this kind of money on our head office building? Then the whole value discussions starts coming up and then we now go back to redo the brief.
>
> (Firm A)

> the general problem in the industry is that you cannot guarantee that the people who initiate the project actually know what they want. They don't have a precise idea of what they want mainly because they are not always professionals in the field. They just need a facility for example an office block. What is possible for an office block is a very large spectrum of activities. We have that challenge from the client narrowing down to specifics of what they want. Mainly they rely on the consultants and the architects are always on hand to help out with that. We quantity surveyors nowadays are getting involved because everything boils down to affordability due to cost constraints. Involving QS early in the briefing process would help in giving some cost guidance.
>
> (Firm A)

Information on Compressed Time Demands

This firm sees compressed time demand as very pervasive in the construction industry and in the operations of the firm, as they continue to experience compressed time demands in virtually all their projects. The need for compressed time demands may either come from the client or from the architect and other designers who may be unable to conclude their designs on time. The inability of the designers to provide the necessary designs therefore put the QS under serious tensions most of the time.

> From the public sector, the timeframe we have nowadays is very appalling, short and poor. You can hardly deliver the quality that you think or that you have the competence to deliver. I think it is a general industry problem in the country. I can tell you from experience that it is problematic at the moment.
>
> (Firm A)

> Within the short period during when the QS has to turn out the tender, the designers might just get stuck with a level of design development that is schematic. You may even be lucky to get schematic drawings because some may be in early sketchy form that the buildability has not even been assessed. If the deadline has to be met, then the deadline has to be met. So the quality of information we receive is generally poor and I have the feeling that they are poor because they have not been given the requisite time to prepare them
>
> (Firm A)

Causes of Compressed Time Demands

Firm A has experienced compressed timelines on most of its projects and refers to it as the norm on projects. Majority of the problems of compressed timelines on projects occur due to problems in the briefing process, as project initiators hardly know what they wanted. The firm's experiences show no early involvement of the QS at the brief stage. Since problems of the briefing process could also lead to increased costs, it is very important for quantity surveyors to be involved on projects at the briefing stage. When a QS participates fully at the briefing stage, it adds value and reduces the back and forth communications which cause delays. Another reason for the compressed timelines is that the quality of design information is poor and many of the drawings given to the QS by the design consultants are too sketchy. Sketchy drawings provide little information that the QS could rely on and hence result into delay in the production of the bills of quantities. However, the sketchy drawings too could be as a result of short deadlines given to the design consultants hence it becomes a cycle. Late budget appropriation is a major cause of compressed timelines on public sector projects. By law, public sector projects cannot take off until the National Assembly appropriates budget. Most times, budget is appropriated around the middle of the year for which the budget is meant. This significant delay is due to the complicated political process, which has proven to be difficult to shorten. By the time the budget is appropriated by the relevant Act of the National Assembly, there is a lot of pressure to try to accomplish the projects within the remaining months in the year.

> Because their deadlines are very short, what architect and engineers turn out are very sketchy for a tendering process that has to follow the traditional method. For example, if you look at the RIBA plan of work, you need to have the detailed engineering design before you can have the detailed tender information.
>
> (Firm A)

> When a public sector department wants to build a head office building and they managed to get it into the budget (Appropriation Bill), they have to wait till it becomes a law before they can start to implement. Now we are in the month of May and just a few days ago the Appropriation Act was signed into law. So, we have just barely 7 months to execute the projects and within these 7 months you have to follow the legal procurement process to engage your consultants, do a proper tender and then sign the contract before the appropriation period closes after which they are not able to access the money for the project. So, it is problematic. I think the problem lies beyond the scope of what we can solve as consultants. What we do is to try as much as possible to use our professional experience to help the public sector departments as much as we can to get the job done. It is a very difficult situation.
>
> (Firm A)

Responses to Compressed Time Demands

This firm responds to compressed timelines through some innovative techniques in organisational structuring, ICT and overlapping of project phases. The innovation in organisational structuring is the division of personnel into core and non-core staff. This allows the core staff that operate only at the head office to be fully trained to respond to the demands of the client as it relates to compressed timelines and other serious issues. Non-core staff are kept on project sites and charged with the responsibilities of preparing valuations, attending site meetings and performing all procedural site-based activities. The core staff can be classified as the elite corps or *Special Forces* that hold the key responsibilities of the firm. The strategic planning and survival of the firm depends on this elite corps of staff in ways that is not seen in other firms that operate conventional human resource strategy. These core staff control all the operational and strategic resources of the firm and they are proficient in the use of latest state-of-the-art ICT infrastructure that helps the firm to deliver very challenging responsibilities within very short timelines. Although, the firm is not definitive in classifying this initiative as innovation however, if considered within the parameters that define innovation as a new idea within a firm, implemented within a firm and that brings about benefits to the firm, it could be inferred that if the initiative meets these parameters, it could then be classified as innovation.

The second innovation technique is the deployment and application of the latest ICT resources in the form of hardware and software. The firm have computers with relevant software (database and other application software like CATO Pro suite and COSTX) used for the preparation and delivery of pre-contract documents. The firm prides itself as a leading quantity surveying firm in ICT development and innovation in Nigeria and is happy that many other firms are following her example. To be the industry leader or to be able to efficiently and effectively respond to client demand, a QS firm must do something different by innovating. This is even more important not only because clients' demands are changing but because QS roles are also evolving.

The third initiative in responding to compressed timelines in this firm is by overlapping project phases. One of the responsibilities of the core staff is to identify the key project phases and develop ways of overlapping the phases as much as possible in order to save time while maintaining quality and working within the confines of the legal framework. For instance, and depending on the characteristics of each project, it may be possible to overlap the design, tendering and construction phases in such a way that tender is possible while the design is still on-going even though the traditional procurement method is used. Although overlapping project phases could lead to increased costs particularly where the project is very complicated, the increased cost may have to be juxtaposed with the benefits of timely procurement and completion before the client takes the final decision. In this scenario, clients usually set cost limits for which the designs are to comply. This acts as checks against any excessive increase in cost as the designers are then designing to cost. The complicated budgeting process is a political issue and the solution may not lie within the reach of the procuring MDAs but it is the commitment of the QS consultant to be innovative so as to assist the client to successfully procure its projects within the shortest available timelines through innovative techniques.

> You need competent personnel. That is number one…then you need the basic ICT tools that will help you to run through the process…once you have the right personnel that have the basic requisite knowledge of quantity surveying and you give them the tools to work with mainly ICT tools, then the rest is as good as done
>
> (Firm A)

> We have special bills of quantities preparation software. We use CATO Pro from Causeway. We do use their modules to take off and bill in modules. And of course, the cost planning and other add-ons that come with it.
>
> (Firm A)

> We have much experience. We are able to proceed with the tender. Of course, tendering is one stage of the entire project but then within the other stages of the project lifecycle, issues continue to be resolved. Basically, what we do is to find a way to overlap all the phases
>
> (Firm A)

> Sometimes the public sector has the legal constraints. For example, if a project is for this year, they need to follow the legal process to advertise it within the time limits that has been provided by law. Sometimes they run into problems and the project is almost expiring and things need to be fast-tracked. What we do is to overlap the process by overlapping the design, tendering and construction in such a way that we are able to tender. Then whatever is not finished up in the initial stage continues in the other stages
>
> (Firm A)

Types of Innovation

Firm A agrees that the market is the predominant determinant of the type of innovation that will take place. Business activities are determined by what the market wants and they are in business because of the intention to satisfy the needs of the customer/client. The firm also deliberately engages in resource-push innovation because it is her culture to always look for new way of doing things so that it can be ahead of the pack in the industry. The firm always send staff to conferences to learn new ways of doing things. This, in a way is a combination of market-pull and resource-push innovation where the market in this instance is the software vendor.

> As you know, what the market throws at you is the service you render. It depends on the patronage we have here which is mainly tender documentation
>
> (Firm A)

> No, it doesn't just happen. We deliberately engage in it but not like having a template. The way we work here, we have this group culture especially when you bring in something that is new
>
> (Firm A)

Innovation Challenges

The demand of the client for compressed time is an action force that encourages innovation. Interest of the staff within the firm may either be an action force or a reaction force but in this particular firm, it is an action force as all staff are interested in finding new ways of doing things. Funding is always a challenge to innovation within the firm. The

software is very expensive and it may be a challenge for an average company to procure. However this firm has strived to procure all necessary software so as to enhance the way they do things particularly during pre-contract documentation.

> In fact, the way project financing is now, it is very difficult and it is emerging as a very key constraint in the construction industry. There are many competing ends and many businesses have a lot they need to do with money. So, money always brings the first constraint
>
> (Firm A)

> If a firm is not getting enough commission to finance the ICT requirements, that is a very big constraint in doing any successful business
>
> (Firm A)

> A key barrier to new ideas in any firm is when people are not giving themselves to learning. When you think that the level of knowledge you have is adequate for what you are doing and you do not want to improve yourself. That could stagnate an individual from developing
>
> (Firm A)

Innovation Outcome

There appears to be no single fix for compressed timelines during pre-contract documentation in Nigeria and in most of the times in this firm, a combination of these innovation initiatives are applied in order to achieve an appreciable reduction on the pressures of compressed timelines. The innovation in ICT enables the firm to work in real-time with other consultants without waiting for the designers to complete their design and produce hard copies of the design sequel to the active involvement of the quantity surveyor. Furthermore, innovation enables the firm to operate a small office structure thereby reducing the human resource cost, as fewer hands are required because software is now deployed to perform most of the procedural duties previously done by the quantity surveyor. And of course, human resource cost is a significant cost centre in most QS firms.

Overlapping of project stages provides a way of crashing the timeline although there are legal and contractual issues to contend with. Organisational structuring enables work to be done without the conventional bureaucracy that is associated with hierarchical organisational structure and its concomitant waste of time. Except time delay through budgetary appropriation that is highly unpredictable, most problems of compressed timelines are addressed by a combination of the innovative initiatives of organisational

structuring, ICT deployment and overlapping of project phases. The outcome of innovation in the firm could be adjudged as very successful.

> What benefits do you think that the firms stand to gain if they innovate? Of course, the first thing is that you stay in business
>
> (Firm A)

> Because we always aim to be at the head of the pack and because we have seen other firms trying to copy the way we do things here, it means that we are kind of ahead and therefore we are highly innovative in comparison with the rest of the local firms here
>
> (Firm A)

Advice to Industry

Pre-contract timelines will always be short, only by being innovative can it be resolved. Therefore, all project stakeholders in general and QS consultants in particular need to develop innovative and continuous improvement mind-set during project conceptualisation, execution and delivery. QS firms must invest in ICT as it is becoming more and more indispensable in the operational process of the QS practice. The good news is that hardware and software are now getting cheaper and software in particular can easily be procured by cashing-in on modularisation and buying the modules of critical interest instead of the whole package. Interoperability, where different software modules from different vendors are now able to work together on same platform, is now a very popular consideration in software development and has further made application software cheaper. In addition to the acquisition of ICT infrastructure, QS firms must build capacity of their staff to be able to operate the ICT infrastructure. People must learn new things and new ways of doing things if they must improve. Design consultants must be able to factor-in the timeframe required by the quantity surveyor to produce the bills of quantities and other pre-contract documents. This should be expressly included in the pre-contract programme and followed accordingly by releasing relevant drawings to the QS on time.

> Because our role in the industry is evolving every day. It is changing. Twenty years ago what quantity surveyors were doing is quite different from what they do today. So, our role is changing and for quantity surveyors to be relevant in the industry, every QS firm needs to be innovative.
>
> (Firm A)

QS firms need to be innovative as much as possible and improve our processes and embrace the ICT technology that is available around the world.

(Firm A)

The types of software available now are in modules in which a firm can purchase each module at a time. This makes it cheaper.

(Firm A)

9.2.3 Case Study 1 Summary: Firm A

Table 9.2: Thematic Matrix of Data Sources for Firm A

S/N	THEMES	INTERVIEW	DOCUMENT	OBSERVATION	ANALYST SUMMARY
1	Pre-contract Documentation	pre-contract document seen as very important; improper documentation leads to problems; early preparation is necessary. "b*uildings are getting very expensive, even small buildings, and it is more the case with the big ones except where the client has limitless funding. You want to know how much the project you are going to have will cost you ab initio. And that helps you prepare yourself for the funding*"	communications between clients and QS show urgency and importance of pre-contract documents.	a number of past and current pre-contract document seen being consulted.	Pre-contract document seen as very important; improper documentation leads to problems; early preparation is necessary.
2	Information on CTD (Compressed Time Demand)	late receipt of brief and data put pressure on QS; experiences CTD on all projects; CTD from clients and designers. "*we have always known, as quantity surveyors, that we are the final set of consultants to receive documentation for the production of contract documents. And the pressure comes heavily on us to meet the finishing deadline*".	communications between clients, designers and QS show late receipt of design information.	phone call during the interview gave an indication of late receipt of design information.	Late receipt of brief and data put pressure on QS; QS experiences CTD on all projects; CTD is from clients and designers.
3	Causes of CTD	delays in taking actions cause CTD; no early involvement of QS in decision; poor design information at early stage; late budget appropriation. "*I think it is the cultures of the way a lot of these organisations operate. Like in the core ministries for example, it is when the budget year is going to an end that they realise that they have left something undone and they want to get it done within the budget year".*	correspondences show reminders on actions that were long overdue.	phone call during the interview gave an indication of late receipt of design information.	Delays in taking actions cause CTD; no early involvement of QS in decision; poor design information at early stage; late budget appropriation.

4	Responses to CTD	responds to CTD through innovative techniques of organisation structuring, ICT and overlapping of project phases. *"We are now getting our drawings from the soft form (CAD or Revit) and we measure from there. We have actually now moved to BIM. Some of our staff went to England for some training on BIM and we are at the learning stage. We hope that by the end of this year we'll be there and ready".*	organogram shows a flat organisation; communications between software vendor and QS on operational issues indicate long-standing relationships.	open door policy and easy interaction between staff and directors clearly visible; lean staffing (5 QS) seen at head office, CATO software seen in use although for post-contract services.	Firm responds to CTD through innovative techniques of organisation structuring, ICT and overlapping of project phases.
5	Types of CTD	innovation in the firm are both market pull and resource push; both types of innovation are not mutually exclusive but complementary. *"When there is sufficient resource from within, of course you continue to look for easier ways of getting things done. And in the process, if the market is ready, you find yourself responding to it very quickly*".	communications with project teams requesting for quick delivery of document confirm need for market pull innovation; staff attendance at innovative seminars points towards resource-push innovation.	discussions with staff show that they are well knowledgeable and empowered to be innovative.	Innovation in the firm are both market pull and resource push; both types of innovation are not mutually exclusive but complementary.
6	Innovation Challenges	action and reaction forces present challenges; action forces are client demand; reaction forces are high cost of software and technical challenges of learning new software. "*In fact, the way project financing is now, it is very difficult and it is emerging as a very key constraint in the construction industry. There are many competing ends and many businesses have a lot they need to do with money. So, money always brings the first constraint".*	communications requesting for quick delivery of document confirms the presence of action forces; invoices showing high cost of software confirm reaction forces.	top management were seen encouraging innovation in the firm; support of top management is an action force.	Action and reaction forces present challenges; action forces are client demand; reaction forces are high cost of software and technical challenges of learning new software.
7	Innovation Outcome	successful in the use of innovative techniques to respond to CTD. *"Because we always aim to be at the head of the pack and because we have seen other firms trying to copy the way we do things here, it means that we are kind of ahead and therefore we are highly innovative in comparison with the rest of the local firms here".*	evidence of contract signing of past projects confirm successful outcome; evidence of practical completion of past project confirms successful outcome.	seen working on post-contract services of successful projects that were initially affected by compressed timeline.	Firm is successful in the use of innovative techniques to respond to CTD.
8	Advice to Industry	clients must provide early and clear briefs, speed up budgetary process and provide design information on time; QS to engage ICT, BIM and practice-based research. *"Firms should not be afraid to go to an uncharted land. And if the world had stayed on the safe ground all along, progress would have been stranded".*	Some staff have made presentations on areas that relate to innovation in the industry.	Firm is very willing to advise the industry as demonstrated by accepting to be respondent in this research and by giving series of advice during the interview sessions.	Clients must provide early and clear briefs, speed up budgetary process and provide design information on time; QS must engage ICT, BIM and practice-based research.

Pre-contract Documentation

Firm A views the pre-contract documents as very important because if they are not done correctly, the contract gets into problems. Very few clients know what they really want so, many clients require the consultants to produce the required documents that translate client's intention into documents that could be understood and priced by tenderers. These documents are therefore very important if the project is to be successful. Pre-contract documentation however has to start very early in the project when the client brief is received or being prepared. When the quantity surveyor is involved at this early stage, it enables the preparation of quality pre-contract documents, which become essential tools in post-contract practice.

Information on Compressed Time Demands

From the experience of Firm A, it is obvious that the quantity surveyor is usually the last of the consultants to receive necessary data for the preparation of pre-contract documents. This therefore puts a lot of pressure on the quantity surveyor to work within very tight timelines and cause compressed time demands and its associated problems. The demand for compressed time is so pervasive that it happens on all projects handled by Firm A without any exception. The need for compressed time demands may either come from the client or from the architect and other designers who may be unable to conclude their designs on time. The inability of the designers to provide the necessary designs therefore put the quantity surveyor under serious pressures most of the time.

Causes of Compressed Time Demands

Firm A sees the major reason for compressed time demands as the effects of the culture in Nigeria of always waiting till the last moment before taking action. What could be done on time is always left undone until the time is almost over. Some problems of compressed time demand occur due to problems in the briefing process, as project initiators hardly know what they wanted. The firm's experiences show no early involvement of the quantity surveyor at the brief stage. Since problems of the briefing process could also lead to increased costs, it is very important for quantity surveyors to be involved on projects at the briefing stage. Another reason for the compressed timelines is that the quality of design information is poor and many of the drawings given to the quantity surveyor by the design

consultants are too sketchy and delivered late. Sketchy drawings provide little information that the quantity surveyor could rely on and hence result into delay in the production of the bills of quantities. Late budget appropriation is also a major cause of compressed timelines on public sector projects because, by law, public sector projects cannot take off until the National Assembly appropriates budget.

Responses to Compressed Time Demands

Firm A responds to compressed demands through some innovative techniques in organisational structuring, ICT and overlapping of project phases. Firstly, the flat organisation structure operated by the firm assists the firm in making quick and strategic decisions. This creates an open environment that allows the freely sharing and cross-fertilisation of ideas within the firm. The firm also develops the tactics of elemental preparation of bills of quantities using core staff with each core staff concentrating on an element of the project at a time. This has helped greatly in reducing the time for bill of quantities preparation and consequently pre-contract documentation.

Secondly, the firm uses extensive application of information and communication technology. The firm deploys modern computer systems with the latest application software (like CATO Pro suite and COSTX). They now use the application software to take-off quantities straight from the soft copies of the drawings and this has saved a lot of time and improved the firm's ability to respond to changes in design proposals. The third initiative in responding to compressed timelines is by overlapping project phases. One of the responsibilities of the core staff is to identify the key project phases and develop ways of overlapping the phases as much as possible in order to save time while maintaining quality and working within the confines of the legal framework. For instance, it may be possible to overlap the design, tendering and construction phases in such a way that tender is possible while the design is still on-going even though the traditional procurement method is followed.

Types of Innovation

In Firm A, innovation could either be market-pull or resource-push but they are not mutually exclusive since one complements the other. Market-pull innovation is caused by

factors like client's demand from consultants to deliver pre-contract documents within compressed timelines. When this pressure is high, consultants are forced to innovate in order to meet up. Resource-push innovation happens when the firm, due to its financial and human resource determines to innovate to improve its operations. It may be because it has the financial power or that the human resource is always very interested in doing things differently. Either way, the firm believes that the need for resource push innovation will only come up if the market is buoyant. Also, even though there may be the market demand to innovate for example to the use of latest software to perform a certain task, without the financial support or the interest of the human resource in using the software, it may be difficult to respond to such market demands.

Innovation Challenges

The firm notes that it is extremely difficult to work without using latest technology. The pressures of compressed time demands would require the need to innovate either the process of delivery or the deliverables. There are however a series of action and reaction forces that support or restrain innovation in Firm A. These include the ability of the personnel to accept new ways of working, the technical challenges of learning to use new software and the sometimes very high cost of procuring ICT facilities which is more prevalent in less developed countries. The demand of the client for compressed time is an action force that encourages innovation. Interest of the staff within the firm may either be an action force or a reaction force but in this particular firm, it is an action force as all staff are interested in finding new ways of doing things. Funding is always a challenge to innovation within the firm. The software is very expensive and it may be a challenge for an average company to procure. However, this firm has strived to procure all necessary software so as to enhance the way they do things particularly during pre-contract documentation.

Innovation Outcome

The applications of the various initiatives like organisational structuring, ICT and overlapping of project stages have enabled the firm to successfully respond to compressed time demands. Although there is still much to be done in responding to the demand for compressed timelines, the experience of the firm in innovation during past projects could be taken as very successful. This has made the firm to also embrace BIM to further

improve the ability to deliver the pre-contract documents on time. The problem with BIM however is that other consultants like the architect and engineers are yet to fully imbibe the BIM culture in the Nigerian construction industry.

Advice to Industry

On the part of the clients, there is need for them to be able to provide clear, meaningful and understandable briefs. More organisations are now engaging construction professionals as in-house professionals to help in preparing realistic briefs. This should be encouraged in all client organisations. The budgeting process is still a problem and the client could do very little to speed up the budgeting process as the power to do this still lie with the legislators. Also, designers should be able to factor the timing for the quantity surveyor to prepare the bills of quantities into their programme. The present situation whereby the quantity surveyor is left with no time to prepare the bills of quantities is counter-productive. All the consultants should engage in BIM so as to have information made available to all consultants in real time.

While QS firms must invest in ICT as it is becoming more and more indispensable in the operational process of the QS practice, they must also build capacity of their staff to be able to operate the ICT infrastructure. QS firms should engage in innovation not only because it boosts productivity but also because it allows the quantity surveyor more time to concentrate on the core cost management duties while procedural functions are performed through information technology. This would be made possible if the top management of quantity surveying firms should develop innovative minds and own the innovation process. Finally, every QS firm should see itself as a research organisation that takes note of challenges during compressed time demands and researches about what to do to resolve the challenges when the workload is less. In this way there will be continuous improvement in the way projects are delivered generally. Innovation therefore supports continuous improvement.

9.3 Case Study 2: Firm B

The results of the Case Study 2 interviews, documents and personal observation are presented and structured thematically.

9.3.1 Interview 1

Introduction

The firm was first registered in 1985 but latter incorporated in 1991. It was incorporated due to the need to work with international partners like the World Bank, African Development Bank and the like who were more comfortable dealing with corporate bodies. It was also established because of the need to take overall responsibility of projects as project managers. This also helped in the successful formation of alliances with some international firms. The firm started with two partners on a 60:40 ownership arrangement. Currently it has three partners with 40:30:30 ownership structure. The firm is registered with the NIQS and QSRBN. It is also registered with the World Bank and Islamic Development Bank where the firm's name is on the DACON (Data on Consultants) of the two international banks. Their operations are essentially in quantity surveying and project management although there are some incursions into other areas relevant to the competencies of a QS firm. The firm operates with 4 managerial staff and 7 core permanent quantity surveyors with the flexibility of engaging other quantity surveyors when the workload demands. For example, in 2016, there were 4 managerial staff and a total of 19 quantity surveyors engaged in the firm.

Pre-contract Documentation

This firm concentrates on costs and ensures that both client and other consultants are aware of it. Cost being central to the project is better taken care of at the pre-contract documentation stage. The pre-contract documentation stage is therefore very important because it has considerable impact on the cost and time for execution. According to the firm, the probability of projects failing increases when the pre-contract documents are not well prepared. The firm has therefore instituted three levels of quality checks to prevent this in the firm.

> I think where projects failed are where the contract documents are not well prepared. Where they are prepared very well, especially the designs, where the architect designs the projects and mindful of the details and where also the cost estimate is thorough, the issue of any type of cost overrun or time overrun would be limited. So, the documentation helps a lot.
>
> (Firm B)

Information on Compressed Time Demands

The firm experiences compressed time demands frequently on its projects. Most of the time they are caused by clients who just feel that they can ask for pre-contract documents at any time oblivious of the time it takes to get it prepared. The Procurement Act also stipulates some mandatory things like advertisement that must be done whether time is short or not. The firm also considers the impulsive nature of government officials as a factor for compressed time demands.

> To be honest with you, it happens on all public sector projects. Apart from that of the EFCC that gave us time and maybe that of the CBN, almost all of them are compressed time projects.
>
> (Firm B)

Causes of Compressed Time Demands

Most of its public sector clients would rather want the pre-contract documents to have been ready like yesterday even though they are just asking for it today! An issue that the firm recognises as causing compressed timelines on public sector projects is the demand by some clients requesting quantity surveyors to make provisions for special interests on the projects. And because these requests are unprofessional and fraudulent, the quantity surveyor would naturally refuse to do their biddings. Hence, this normally results in the client delaying the processing of the necessary documentation causing the elongation of the pre-contract timeline.

Furthermore, and particularly on public sector projects that have to be sited in different locations in the country, the client in most cases would want a uniform price for all locations. This is however not possible not only because of differences in terrain and other physical characteristics, there is also the issue of security with its attendant impact on the cost of project delivery. The documentation of a project in the South-South geopolitical zone was shown by the firm to support this argument. Here the final cost was a lot more in the South-South because of the difficult terrain and the unpredictable security concerns. Convincing the client on the need to have different prices for different locations may take time because uniform price might have been allowed in the budget.

Compressed timelines also happen because other consultants like the architect and the engineers delay in releasing their designs and drawings to the quantity surveyor for the preparation of the bills of quantities. Finally, and according to the Public Procurement Act 2007, there are some mandatory requirements of the procurement process, which must be followed and complied with by the procuring agency of government. The need to meet these mandatory requirements means little time is left for the other areas of the project. Hence, the consultants' time appears to be the natural area to compress to fulfil the last-minute rush to get the projects on board.

> Two or more reasons that I can come up with. One is the procurement process that stipulates certain mandatory things to be done. The other thing is the recklessness of the working environment of the client where things will be done at the last minute. The 3rd thing is the impulsive nature of how our projects come up. Maybe a leader will go to a certain location and give a command that things should start, just like a military thing. And because there is a procurement process for certain things that must be done the leader will not see that it may take about 6 months from the time he gave the order for the project to be packaged and for ground breaking. So, they compress things. Instead of advertising and calling for expression of interest to take so and so time, they give a little time. Sometimes they publish it and backdate it.
>
> (Firm B)

> The other thing is the political process. From executive that is preparing the budget, to the assembly that is debating, processing, approving and then coming back to the President for signing before it becomes effective. That's quite some time.
>
> (Firm B)

Responses to Compressed Time Demands

This firm believes that there is nothing that the quantity surveyor can do to stop the client from demanding for compressed pre-contract timeline, as the client is, in herself, handicapped due to the political undercurrents of the budgetary process between the legislative and executive arms of government. However, QS firms can leverage available tools and systems that could mitigate the effect of compressed timelines. The firm believes that QS firms should think ahead to find new ways of dealing with pre-contract project delays and compressed timelines. This involves innovation through the use of information technology and also innovation of the process of pre-contract document production.

> On the clients, there is actually nothing you can do. They have their own timetable and their own delays are discounted and they see your own delay as the issue. They want you to still meet the target even when they have delayed. They'll tell you to go and work day and night to produce the documents.
>
> (Firm B)

> But what we normally do is to try to situate one of our staff in the office of the architect especially even when we have to be getting designs in bits and pieces. If the project is a multifarious project like a school project and if, for instance, the design of the admin block is ready, you can start with that until the designs of other blocks are ready. But if it is single building project we estimate and key-in so, when we re-measure, we find the necessary differentials and fill-in.
>
> (Firm B)

> All the discussions so far are on the assumption that there is ICT. From when the time computer was introduced, I think we converted all our activities around the practice to ICT. We used to operate the basic Excel and Word thing but with the coming of the new software, which are sometimes very challenging, we are ICT compliant in the preparation of our scheduling, programming and specification.
>
> (Firm B)

Types of Innovation

The firm sees the demand of clients asking it to deliver pre-contract documentation within very short timelines as an impetus that pushes the firm to innovate. This is market-pull innovation. However, there are times when the firm engages in innovation due to the demand of its internal processes. This could come from staff, who have attended training courses and who want to practice what they have learnt from such trainings. It could also be from the firm realising that it has enough financial muzzle to adopt latest information technology and system. This is referred to as resource-push.

> They are just matters of development in the profession because sometimes you just realise that your peers are using a certain thing and it is working well for them. And then you also adopt it.
>
> (Firm B)

> What I know we do is that we don't shy away from any new thing that comes from anywhere as long as we find it useful and deployable. So, we deploy it to our system too. We also want to ensure that at every professional development program, we send a certain number of our staff to attend.
>
> (Firm B)

Innovation Challenges

Innovation challenges are the action and reaction forces, which aid or restrain innovation in organisations. Firm B recognises finance as a major barrier to innovation. However, they are resolving this by finding alternative sources of funding outside the conventional means. Size is also a challenge for this firm and a very serious barrier to innovation. The issue of size is also closely related to finance; as small firms do not have the financial muzzle to carry out technological innovation through the procurement of current ICT facilities that will enable them to innovate particularly during the pre-contract documentation period.

> There is the issue of size. I think the current practice firms in Nigeria little realise the limitation of size. While we would be involved in huge infrastructure, the current sizes we have are unlikely to be able to cope. That is why I said that I don't know whether it is innovation or a response to immediate challenge. I think that if we remain in this stage, like a practice of 2 or 3 people, and then we have huge projects; it will be quite a challenge for quantity surveying firms.
>
> (Firm B)

Innovation Outcome

What have been the outcomes of innovation within Firm B on their many projects? Such outcome could either be successful or unsuccessful but when the firm was asked whether the innovation on their projects were successful, the firm was bold to respond in the affirmative. Project pictures and practical completion certificates also support their claims of the successful completion of projects within time. The firm also sees the deployment of ICT and digitalization of operations of its practice as a confirmation of the success of innovation in the firm.

> I think we converted all our activities around the practice to ICT. We used to operate the basic Excel and Word thing but with the coming of the new software, which are sometimes very challenging, we are ICT compliant in the preparation of our scheduling, programming and specification.
>
> (Firm B)

Advice to Industry

Advise to the industry are of two folds, to the clients and to the consulting QS firms. To the former, the firm believes that there is need to start the budgeting time in earnest because of the inherent subsequent delays in the appropriation process. Clients can also involve the QS firm in the preparation of the budget as a separate service. To the QS firm, the only thing that is permanent is change so, QS firms must change from the traditional way of practice to the innovative way of practice so as to remain relevant and marketable. Finally, QS firms should embrace other infrastructure projects outside building because the knowledge gained in such areas can definitely rub on the practice for better.

> I think that quantity surveyors should have been involved in the first place in budgeting to make sure that, first of all, they make adequate provision and you also have the cash flow for the project for the period of execution so that we know what to capture and what project for a particular year. That will save some time, at least you know how much you have before the end of the project.
>
> (Firm B)

> Actually, I think, on reflection, that quantity surveyors should innovate because they should not confine their thoughts to the traditional quantity surveying services
>
> (Firm B)

> Another thing is this feeling that quantity surveyors cling to building, I think that they should go beyond that. There should be quantity surveyors in all engineering and industrial projects. Wherever there will be a need to document number, quantity and so on, I think that quantity surveyors should be able to appreciate that their services are required there and should be able to develop along that line. Sometimes when you have for instance an airport building, quantity surveyors should not only be on the terminal building, they should be on the runway, tarmac, lighting and equipment.
>
> (Firm B)

9.3.2 Interview 2

Introduction

The firm was registered by the Corporate Affairs Commission and has been practising QS for over 20 years. It is also registered professionally by both the QSRBN and the NIQS. Located in the Northwest geopolitical zone with branches in the Northeast and

Northcentral, the firm engages mostly with public projects. The predominant procurement system for most of its projects is the traditional system.

Pre-contract Documentation

The pre-contract documentation is very important because they define the project intention in terms of cost, quality and time. The pre-contract documents enable the bidders to tender on the same basis so that the evaluation of their respective bids can be done using the same parameters. It would be very difficult to implement any construction project, particularly using the traditional procurement system, if there are no pre-contract documents.

> It is always easy to draw a line but the bills of quantities define the scope and give you the limit of your expenditure. But in any case, all the drawings are important because you need it to translate the design into a reality.
>
> (Firm B)

> It would be hard to implement a project without the architectural working drawings, structural working drawings services working drawings, bills of quantities as well as the contract conditions and agreement for a contract to be executed in Nigeria. But it can be done if it is not construction project but within the confines of the tendering process in Nigeria, those are the key documents that are required for a successful project to be implemented
>
> (Firm B)

Information on Compressed Time Demands

Compressed timelines are always problems in this firm. Clients always demand for it either due to a lack of planning for the proposed project or due to factors beyond their control, like delayed budget appropriation process.

> Most of the times they are inadequate. The reasons are mostly on political influence. For instance, if a head of a parastatal wants a new head office built within 1 or 2 years and he knows that time is short, he will naturally put a lot of pressure on the consultants. He may ask the consultants to produce all drawings and bills of quantities within 1 or 2 weeks knowing fully well that this timeline is too tight. Pre-contract timeline is always inadequate in Nigeria and that is why you see some projects abandoned or not completed in time.
>
> (Firm B)

> I will mention two projects. There is the … head office project in Abuja. There is also the … in Bayelsa State where we have similar challenges. In either case, it was through those innovative methods that we were able to deliver the projects.
>
> (Firm B)

Causes of Compressed Time Demands

The causes of compressed time demand during the pre-contract documentation period can be seen as either external or internal. Although the major causes in this firm are external factors like client's demand, there are also internal factors like the lack of appropriate ICT tools, to work with. The architect and other designers may also delay in providing the drawings to the QS for the preparation of the bills of quantities. At worst case scenario all these causes, both external and internal, could aggregate to impact on the timeline of the project. Although the procurement guidelines specify the appropriate timelines to comply with, they are mostly complied with in breach.

> The guidelines are adequate. It is the implementation that is not adequate. For example, the guideline may tell you 12 weeks within when to advertise, procure the consultants and produce the documents. But due to various delays, the actual time available may be only 4 weeks. This is why there is shortage of time.
>
> (Firm B)

> Sometimes the architect will bring new drawings completely different from what was issued initially and this affects our work or ability to produce the bills of quantities on time.
>
> (Firm B)

Responses to Compressed Time Demands

There are innovative and other methods but this firm recognises the innovative ways that maximise the use of modern digital and ICT methods to perform the duties of the quantity surveyor during the pre-contract documentation period. This makes it easier, faster and cheaper to respond to compressed time demands.

> Changes have come to the industry and you need your smart phones and other gadgets. Those tools were not in play before but now they are all in play. For instance, you may be passing through a place and you take a photograph. I could be away on the site but trying to feed my office with information for a project; probably a bill of quantities is being prepared and from the site, you can snap a photograph and within seconds the photograph is received in the office. So, the person preparing the bill of quantities will be able to appreciate the current situation on site while he is in the office.
>
> (Firm B)

Types of Innovation

The types of innovation can be classified into market-pull or resource-push. When the innovation is caused by the actions of the client, it is referred to as market-pull. This is the primary type of innovation in this firm. However, some innovations are initiated from within the firm. These are resource-pull innovation.

> The clients are always the primary source of our innovations. The knowledge and the know-how of the client can help. Some clients have in-house teams that can come up with good briefs of what they want while some clients do not. A client that has a good in-house team would likely make the process easier while a client that does not have that in-house team may not.
>
> (Firm B)

> …there are 2 ways we generate new ideas: internally by the staff and through external sources.
>
> (Firm B)

Innovation Challenges

Innovation challenges are the action and reaction forces. While the action forces encourage innovation, the reaction forces discourage innovation. Also, when staff are refusing to migrate into working in the new way, innovation is constrained. However, many staff of the firm do bring new innovations into the organisation. The support of the management for innovation in this firm is very high and this could be discerned from the high number of staff sent on training regularly.

> Our firm gives some freedom for innovation. When you are stating a path definitely there will be restriction. The initial ideas do come from an individual. Later there may be contributions from other staff to the new idea to further develop it. Following a particular process to innovate is not part of our practice.
>
> (Firm B)

> I would say the managerial and the technical subsystems are the driving forces of innovation. The management matters because they are the driving force of the organisation. Every innovation needs the support of the management.
>
> (Firm B)

Innovation Outcome

The outcomes of innovation in this firm have been successful in most of the times. Projects pictures and certificates of completion are practical evidences that innovation outcome in the firm have been successful. The adoption of digital technology in the firm has also enabled the firm to respond to the seemingly impossible requests of the clients.

> Yes, we were able to deliver and the project is standing there completed.
>
> (Firm B)

> Let me look at my firm from the point of data management. Traditionally, we have these very huge documents kept as hard copies in the office. And you wonder how easy it is to get those documents to any staff that may need it at different locations. What we do now is to scan these documents and produce them in PDF forms so that if Mr. A is at location X1 and Mr. B is at location X2, each of them can access these documents and use it at the same time or any time for that matter. That is one of our current innovations in the office. Everybody is not really tied to the office because of access to hard copies of documents; each staff now has easy access to the soft copies of the documents from any location
>
> (Firm B)

Advice to Industry

The firm recommends that the need to read wide to find out about what is in vogue in the environment is very critical to innovation. QS firms are encouraged to acquire knowledge in multi-disciplinary areas.

> Every QS firm should study more because some of the ideas the firm is looking for are already written in one form or the other somewhere. The secret there is that you need more knowledge and to broaden your knowledge you need to study more.
>
> (Firm B)

9.3.3 Case Study 2 Summary: Firm B

Table 9.3: Thematic Matrix of Data Sources for Firm B

S/N	THEMES	INTERVIEW	DOCUMENT	OBSERVATION	ANALYST SUMMARY
1	Pre-contract Documentation	pre-contract documents have considerable impacts on time and cost hence, it is very important; the probability of project failure increases when pre-contract documentation is not well prepared; enables bidders to tender on the same basis thereby making bid evaluation easy. *"I think where projects failed are where the contract documents are not well prepared. Where they are prepared very well, especially the designs, where the architect designs the projects and mindful of the details and where also the cost estimate is thorough, the issue of any type of cost overrun or time overrun would be limited. So, the documentation helps a lot"*.	examples of pre-contract documentation in previous projects were made available and they were seen to be prepared in details.	a number of past pre-contract documents were seen being consulted.	Pre-contract documents have considerable impacts on time and cost hence, it is very important; the probability of project failure increases when pre-contract documentation is not well prepared; enables bidders to tender on the same basis thereby making bid evaluation easy.
2	Information on CTD (Compressed Time Demand)	experiences CTD frequently on its projects; clients never allowed adequate time to prepare the documents. "*To be honest with you, it happens on all public sector projects. Apart from that of the EFCC that gave us time and maybe that of the CBN, almost all of them are compressed time projects*".	communications between designers and QS show late receipt of design information.	there was no ongoing pre-contract documentation seen during the two days the interview was conducted; body language of respondents shows strong confidence in what they did during previous pre-contract documentation.	Firm experiences CTD frequently on its projects; clients never allowed adequate time to prepare the documents.

3	Causes of CTD	there are both external and internal causes of CTD; some clients just feel that they can ask for documentation at any time they like; fulfilling some Procurement Act stipulated mandatory requirements like advertisement may cause delays; lack of planning causes delays and CTD; other causes of CTD are late receipt of design information and late budget appropriation process. "*Two or more reasons that I can come up with. One is the procurement process that stipulates certain mandatory things to be done. The other thing is the recklessness of the working environment of the client where things will be done at the last minute".*	communications between designers and QS show late receipt of design information.	there was no ongoing pre-contract documentation seen during the two days the interview was conducted; body language of respondents shows strong confidence in what they did during previous pre-contract documentation.	There are both external and internal causes of CTD; some clients just feel that they can ask for documentation at any time they like; fulfilling some Procurement Act stipulated mandatory requirements like advertisement may also cause delays and CTD; lack of planning causes delays and CTD; other causes of CTD are late receipt of design information and late budget appropriation.
4	Responses to CTD	QS use the tools and techniques available to respond to CTD; firm thinks ahead to find innovative way to respond; innovative ways involve the use of ICT and the overlapping of the procurement process where applicable. *"On the clients, there is actually nothing you can do. They have their own timetable and their own delays are discounted and they see your own delay as the issue. They want you to still meet the target even when they have delayed".* *"I think we converted all our activities around the practice to ICT".*	organogram shows a near flat organisation which could allow innovative independent thinking;	open door policy and easy interaction between staff and directors clearly visible; the head office was sparsely staffed due to the deployment of ICT.	QS use the tools and techniques available to respond to CTD; firm thinks ahead to find innovative way to respond on project by project basis; innovative ways involve the use of ICT and the overlapping of the procurement process where necessary.
5	Types of CTD	clients' CTD is a market-pull type of innovation and it is predominant in this firm; resource-push innovation happens at times in this firm; resource-push occurs when already trained staff try to demonstrate what they have learned during training. *"What I know we do is that we don't shy away from any new thing that comes from anywhere as long as we find it useful and deployable. So, we deploy it to our system too. We also want to ensure that at every professional development program, we send a certain number of our staff to attend*".	communications with project teams requesting quick delivery of documents confirm market-pull innovation; staff attendance at innovative seminars points towards resource push innovation.	discussions with staff show that they are well knowledgeable in how to be innovative; the use of smart phones and social media platforms in innovative ways was demonstrated.	Clients' CTD is a market-pull type of innovation and it is predominant in this firm; resource-push innovation happens at times in this firm; resource-push occurs when already trained staff try to demonstrate what they have learned during training.

6	Innovation Challenges	the small size nature of the firm is a challenge to innovation as bigger firms are able to muster the financial power to provide necessary tools for innovation; constant training of staff and the support of top management are the top two action forces that enhance innovation in the firm. "*There is the issue of size. I think the current practice firms in Nigeria little realise the limitation of size. While we would be involved in huge infrastructure, the current sizes we have are unlikely to be able to cope. That is why I said that I don't know whether it is innovation or a response to immediate challenge".*	the documentation of a recent project in the riverine area where client demanded for compressed time even in an unstable terrain is an action force that pushed innovation.	top management were seen encouraging innovation in the firm; support of top management is an action force.	The small size nature of the firm is a challenge to innovation as bigger firms are able to muster the financial power to provide necessary tools for innovation; constant training of staff and the support of top management are the top two action forces that enhance innovation in the firm.
7	Innovation Outcome	innovation outcome is successful in the firm; successful in the use of innovative techniques to respond to CTD. *"I think we converted all our activities around the practice to ICT. We used to operate the basic Excel and Word thing but with the coming of the new software, which are sometimes very challenging, we are ICT compliant in the preparation of our scheduling, programming and specification". "Yes, we were able to deliver and the project is standing there completed".*	evidence of contract signing of past projects confirm successful outcome; evidence of practical completion of past project confirms successful outcome.	saw project photographs and records of past CTD projects that have been completed successfully.	Innovation outcome is successful in the firm; successful in the use of innovative techniques to respond to CTD.
8	Advice to Industry	clients must provide early and clear briefs and speed up budgetary process; client can engage a different consultant to do this for her. QS to properly scan the environment, read wide to know what is in vogue; QS to embrace ICT and other multidisciplinary areas. *"Actually, I think, on reflection, that quantity surveyors should innovate because they should not confine their thoughts to the traditional quantity surveying services".*	past presentation documents seen as demonstration of advice.	Firm is very willing to advise the industry as demonstrated by accepting to be respondent in this research and by giving series of advice during the interview sessions.	Clients must provide early and clear briefs and speed up budgetary process; client can engage a different consultant to do this for her. QS to properly scan the environment and read wide to know what is in vogue; QS to embrace ICT and other multidisciplinary areas.

Pre-contract Documentation

From the case study it is clear that the pre-contract documentation stage is very important because it has considerable impacts on the cost and time for execution. The pre-contract documentation defines the project intention in terms of cost, quality and time. According to the firm, the probability of projects failing increases when the pre-contract documents are not well prepared. The pre-contract documents enable the bidders to tender on the same basis so that the evaluation of their respective bids can be done using the same parameters. It would be very difficult to implement any construction project, particularly using the traditional procurement system, if there are no pre-contract documents. Examples of pre-contract documents of past projects in Firm B were made available and they could be seen to have been prepared in details.

Information on Compressed Time Demands

Irrespective of the serious importance of pre-contract documents, Firm B experiences compressed time demands frequently on its projects. One would have expected that the need for detailed and accurate pre-contract documents would have encouraged clients to allow reasonable time for its preparation. However, the opposite is the case as Firm B finds out.

Causes of Compressed Time Demands

Although the major causes of compressed time demands are external, there are internal reasons too. Most of the time, compressed time demands are caused by clients who just feel that they can ask for pre-contract documents at any time. They are oblivious of the time it takes to get it prepared. The Procurement Act stipulates some mandatory things like advertisement that must be followed and complied with by the procuring agency of government whether time is short or not. These activities do eat, in large measure, into the time available for preparing pre-contract documents. Other causes of compressed pre-contract time demand include lack of planning, lack of understanding of project parameters and conditions, delays in the receipt of architect's and engineers' designs and drawings, delays in budget appropriation process and the impulsive nature of government ministries, departments and agencies in initiating projects.

Responses to Compressed Time Demands

Firm B believes that there is nothing that the quantity surveyor can do to stop the client from demanding for compressed pre-contract timeline, as the client may also be handicapped due to the political undercurrents of the budgetary process between the legislative and executive arms of government. However, QS firms can leverage available tools and systems that could mitigate the effect of compressed timelines. Firm B equally believes that QS firms should think ahead to find new ways of dealing with pre-contract project delays and compressed timelines. This involves innovation through the use of information technology and also innovation of the process of pre-contract document production. The innovative ways may deploy the use of modern digital and ICT methods to perform the duties of the quantity surveyor during pre-contract documentation. This makes it easier, faster and cheaper to respond to compressed time demands.

Types of Innovation

Firm B sees the demand of clients asking it to deliver pre-contract documentation within very short timelines as an impetus that pushes Firm B to innovate. When the innovation is caused by the actions of the client, it is referred to as market-pull. This is the primary type of innovation in this firm. However, there are times when Firm B engages in innovation due to the demand of its internal processes. This does come from staff, who have attended training courses and who want to practice what they have learnt from such trainings. It also does come from the firm realising that it has enough financial muzzle to adopt latest information technology and system. This is referred to as resource-push.

Innovation Challenges

Innovation challenges are the action and reaction forces, which aid or restrain innovation in organisations. While the action forces encourage innovation, the reaction forces discourage innovation. Firm B recognises finance as a major barrier to innovation. However, they are resolving this by finding alternative sources of funding outside the conventional means. Size is also a challenge for Firm B and a very serious barrier to innovation. The issue of size is also closely related to finance, as small firms do not have the financial muzzle to carry out technological innovation through the procurement of current ICT facilities that will enable them to innovate particularly during the pre-contract

documentation period. Also, when staff refuse to migrate to a new way of working, innovation is restrained. However, many staff of Firm B do bring new innovations into the organisation. The support of the management for innovation in Firm B is very high and this could be discerned from the high number of staff sent on training regularly.

Innovation Outcome

What have been the outcomes of innovation within Firm B on their many projects? Such outcome could either be successful or unsuccessful but when the firm was asked whether the innovation on their projects were successful, the firm was bold to respond in the affirmative. Project pictures and practical completion certificates also support their claims of the successful completion of projects within time. The firm also sees the deployment of ICT and digitalization of operations of its practice as a confirmation of the success of innovation in the firm.

Advice to Industry

Firm B's advice to the industry are of two folds, to the clients and to other consulting QS firms. To the former, the firm believes that there is need to start the budgeting process in earnest because of the inherent subsequent delays in the appropriation process. Clients can also involve the QS firm in the preparation of the budget as a separate service. To the QS firm, the only thing that is permanent is change so; QS firms must change from the traditional way of practice to the innovative way of practice so as to remain relevant and marketable. Finally, QS firms should embrace other infrastructure projects outside building because the knowledge gained in such areas can definitely rub on the firm's practice for better. Firm B also recommends the need to read wide to find out about what is in vogue in the environment. QS firms are encouraged to acquire knowledge in multi-disciplinary areas.

9.4 Case Study 3: Firm C

The results of the Case Study 3 interviews, documents and personal observation are presented and structured thematically.

9.4.1 Interview 1

Introduction

The firm was established in 1982 by four partners in the northwest of Nigeria. It was registered with the NIQS and QSRBN subsequently for the practice of quantity surveying and project management. Having grown into a multi-disciplinary firm it now has its head office in the Northcentral and a branch office in the southwest. Most of the commissions of Firm C come from the public sector.

Pre-contract Documentation

Firm C sees pre-contract documentation as very important to the success of the entire project but notices that clients seldom consider this. All client attention is on awarding the contract without necessarily getting the documentation right at first. Most clients enter into contractual arrangements without first knowing what they really wanted. Little wonder there are problems during contract administration.

> The issue with choice is that most of the time it is dictated by the client. Once a client focuses on awarding contract that is where their goal is. Anything else becomes difficult
>
> (Firm C)

> Maybe there are exceptions here and there but in all my years of experience I have not met any client that I can confidently say that they went into something (project) knowing fully what they actually want and conveying it to those that will deliver it to capture exactly what they want.
>
> (Firm C)

Information on Compressed Time Demands

From the experience of Firm C, almost all the projects they have been engaged on have compressed time demands in one way or the other from their clients. Since the attention of the client is on awarding the contract probably due to the budget appropriation coming late, nothing else matters but to hasten the consultants to prepare the documentation for the award.

> Yes we have…. a lot of them
>
> (Firm C)

> Even at that, the whole thing was extremely difficult. It was like a lost cause because all of these programmes that we analysed did not have the kind of timeline restriction that this programme we are going into had.
>
> (Firm C)

> Once a client focuses on awarding contract that is where their goal is. Anything else becomes difficult
>
> (Firm C)

Causes of Compressed Time Demands

Compressed timelines are caused either by external or internal factors. From the experience of Firm C, external factors are either the client directly requesting for compressed timeline or from the other consultants' inability to conclude their own documentation for the QS to work with. There are no internal causes in this firm as all causes are external.

> It was a massive project that has never been contemplated or done before and nothing short of a miracle could make that happen. To make matters worse, there was a very short period that those projects must be delivered to fit into the political programme. So that was the challenge.
>
> (Firm C)

Responses to Compressed Time Demands

Responses to compressed timelines could be by innovative or other methods. When confronted with compressed time demands, Firm C looks for innovative strategy and in a particular case it adopted a new procurement strategy that removed officialdom and allowed the project to flow efficiently. This was done through a programme management manual that takes away discretion and authority from the Ministries and Agencies and reduced everything to something mechanical or objective. Added to this is the deployment of ICT resources that enabled the project to be delivered on time. A look at this manual shows how all activities to be executed at the pre-contract stage were itemised in detail. It requires either YES or NO to confirm if the activity had been done or not. There is no provision for reasons why something was not done. If a staff did not do something and it is

marked NO on the manual, the duty of the next senior person is simply to get that thing done and straighten the bottleneck.

> We finally agreed to change the procurement strategy completely away from what was known. The worst enemy of project delivery and administration when it comes to implementation is officialdom and bottlenecks. When somebody up there in the ministry must do something and clear something. When you do evaluation and it went into the account system at the ministry, there is bureaucracy.
>
> (Firm C)

> The implementation for the local government project with a manual that show them how you can procure, how you must employ and what you must do. It was a big document and we are extremely proud of it. And for the 1st time ever, a programme of that magnitude was made in that incredible short time and it was applied and it was delivered successfully
>
> (Firm C)

> Not only did we adopt computer but also we forced the Institute (NIQS) to adopt it. We offered free time and hired the consultants to come to Nigeria and train people in the hardware and software. It was the first time that we can have all our standard documents in soft copy and it made life easy. If you ask those that were unfortunate to be practicing before then they will tell you how difficult it was. That one enabled us to develop something new. In my view, it was innovation.
>
> (Firm C)

Types of Innovation

Innovation could be classified as market-pull and resource-push innovations. In Firm C, innovation is both market-pull and resource-push. A market-pull innovation that the firm introduced is the executive summary in the tender report. Based on the environmental scanning and the complaints received from Chief Executives of various organisations, the firm decided to innovate the executive summary, which has been a feature of all tender reports produced by the firm. When staff attend conferences or when they are trained in some areas, this generates new ways of thinking which will consequently cause new way of doing things in the firm. This is also resource-push innovation.

> For example, we are the first firm that introduced the notion of an executive summary into a tender document. Why? Because inasmuch as we are very proud as to what happened during the tender analysis technically (the tables

> and their analyses, the dispersion and other statistics, on a second reflection we started asking questions about the real users of the tender report. They are the busy executives who have no time to go through the technical details. We therefore made it as a matter of policy that the 1st thing when you are doing a tender report is that there should be about 2-3 pages that a decision maker will bring out all that he needs to know to make appropriate decision. If for any reason any other technical person wants to go into the details of how the summary were arrived at, the main body is still there. And it helped. It works and it is like innovation but it is more driven by looking at who is the consumer of what you do. This is like market pull in which the market is directing what you do.
>
> (Firm C)

Innovation Challenges

Innovation challenges are the series of action and reaction forces that drive or restrain innovation in an organisation. In Firm C, the support of management is the most important action force that drives innovation. Also important is the enthusiasm and interest of staff in looking for a new way of doing things. Of course the technical challenges of technological innovation like learning new software coupled with the high cost of acquiring the software are reaction forces, the interest of staff and management in innovation always ensure that such reaction forces are overcome.

> The whole system is about the fact that nobody is above learning something new; not even the principals. It is also to encourage those below so that they consider what they do. They may not have to subordinate fully to whatever we feel or how we've been doing things before now. It is therefore to encourage them to find new ways of meeting the challenges
>
> (Firm C)

> And to be quite fair, that one was only possible because we had absolute backing from the very top of the political structure. Taken away that bit, I wonder where we'll be
>
> (Firm C)

Innovation Outcome

The outcome is to determine whether the innovation initiative was successful or not. From the experience of Firm C, innovation embarked upon was successful as the pre-contract documents were delivered within the compressed time.

> The implementation for the local government was with a manual that shows how you can procure, how you must employ and what you must do. It was a big document and we are extremely proud of it. And for the 1st time ever, a programme of that magnitude was made in that incredibly short time and it was applied and it was delivered successfully.
>
> (Firm C)

> Like in the PTF days, there were constellation of professionals but the QS there was key. What was behind these processes and procedures? And to me that was the ultimate innovation and the difference that it made. Just look at these two programmes: party office programme and PTF programme. Their relative success in achievement and implementation is huge in the time available compared with any other before or after
>
> (Firm C)

Advice to Industry

The advice of Firm C to QS firms is that they should embrace innovation, as it will enhance the efficiency and effectiveness of their operations. With innovation they are more likely to deliver pre-contract documents within compressed timelines within an environment that is daily putting more pressure on them to work within shorter time. Clients need to also plan well so they can commence their projects in good time to forestall the need to ask consultants to work within compressed timelines.

> As a senior member of the profession, I am using my position to force the Institute to encourage its members to innovate and we have some relative successes in that area but we are still far behind because the bulk of our members are that lazy. They don't want to innovate anything. So we have a lot of work to do in that respect.
>
> (Firm C)

> This is the power of information. If you don't have the access to the tariff rates and if you don't spend the energy and time to look at it, then you won't know. So, this is just how we gave one manufacturer a big shot and it is by using the power of information. The same thing goes with anything innovative. If you don't have the information, you don't have the general feel of where you are going, hardly can you achieve real success in innovation. If you are trying to encourage somebody innovate, make sure that you pass the fundamental information to him. That power of information, how you use it, how you'll do it different than anybody else has done, those are all ingredients that need to fall into place for you to see the design project.
>
> (Firm C)

9.4.2 Case Study 3 Summary: Firm C

Table 9.4: Thematic Matrix of Data Sources for Firm C

S/N	THEMES	INTERVIEW	DOCUMENT	OBSERVATION	ANALYST SUMMARY
1	Pre-contract Documentation	although pre-contract documentation is very important, clients seldom consider this; most of the time clients' attention are on awarding contracts without paying attention to what have to be done before the award; this brings a lot of problems during post-contract administration. "*Maybe there are exceptions here and there but in all my years of experience I have not met any client that I can confidently say that they went into something (project) knowing fully what they actually want and conveying it to those that will deliver it to capture exactly what they want.*"	correspondences between clients and QS show urgency and importance of pre-contract documents.	a number of past pre-contract document seen being consulted.	Although pre-contract documentation is very important, clients seldom consider this; most of the time clients' attention are on awarding contracts without paying attention to what have to be done before the award; this brings a lot of problems during post-contract administration.
2	Information on CTD (Compressed Time Demand)	CTD happens on almost all projects engaged upon by the firm; CTD is widespread; since clients are only concerned with awards, they exert utmost pressure on consultants to produce the pre-contract documents. "*Yes, we have…. a lot of them*".	correspondences between clients, designers and QS show late receipt of design information.	interactions during the interview gave an indication of late receipt of design information.	CTD happens on almost all projects engaged upon by the firm; CTD is widespread; since clients are only concerned with awards, they exert utmost pressure on consultants to produce the pre-contract documents.
3	Causes of CTD	causes of CTD are from external factors of either the clients requesting for it or design consultants' inability to conclude their designs on time. "*It was a massive project that has never been contemplated or done before and nothing short of a miracle could make that happen. To make matters worse, there was a very short period that those projects must be delivered to fit into the political programme. So that was the challenge.".*	correspondences show reminders on drawings that were long overdue yet, being awaited.	interactions during the interview gave an indication of late receipt of design information.	Causes of CTD are from external factors of either the clients requesting for it or design consultants' inability to conclude their designs on time.

4	Responses to CTD	when confronted with CTD the firm looks for innovative strategies; adopting a procurement strategy that eliminates officialdom; deployment of ICT. *"Not only did we adopt computer but also we forced the Institute (NIQS) to adopt it".*	communications between software vendor and QS on operational issues indicate long-standing relationships.	lean staffing seen at head office due to the impact of ICT.	When confronted with CTD the firm responds by looking for innovative strategies; adopting a procurement strategy that eliminates officialdom; deployment of ICT.
5	Types of CTD	innovation in the firm are both market-pull and resource-push; creating executive summary in a tender report was a market-pull innovation of the firm in Nigeria; staff attending seminars, conferences and trainings develops the staff and engenders resource-push innovation. *"For example, we are the first firm that introduced the notion of an executive summary into a tender document in Nigeria*".	communications with project teams requesting for quick delivery of document confirm need for market pull innovation; staff attendance at innovative seminars points towards resource-push innovation.	discussions with staff show that they are well knowledgeable and empowered to be innovative.	Market-pull and resource-push; creating executive summary in a tender report was a market-pull innovation of the firm in Nigeria; staff attending seminars, conferences and trainings develops the staff and engenders resource-push innovation.
6	Innovation Challenges	management support is the most important action force that drives innovation in the firm; enthusiasm of staff in looking for new ways is another action force; technical challenges of learning a new software is a reaction force; high cost of software is another reaction force. "*And to be quite fair, that one was only possible because we had absolute backing from the very top of the political structure. Taken away that bit, I wonder where we'll be".*	invoices showing high cost of software confirm reaction forces.	top management were seen encouraging innovation in the firm; support of top management is an action force.	Management support is the most important action force that drives innovation in the firm; enthusiasm of staff in looking for new ways is another action force; technical challenges of learning a new software is a reaction force; high cost of software is another reaction force.

7	Innovation Outcome	successful in the use of innovative techniques to respond to CTD; all projects were completed; many organisations have adopted the program manual. *"The implementation for the local government was with a manual that shows how you can procure, how you must employ and what you must do. It was a big document and we are extremely proud of it. And for the 1st time ever, a programme of that magnitude was made in that incredibly short time and it was applied and it was delivered successfully.".*	evidence of contract signing of past projects confirm successful outcome; evidence of practical completion of past project confirms successful outcome.	seen working on post-contract services of successful projects that were initially affected by compressed timeline.	Firm is successful in the use of innovative techniques to respond to CTD; all projects were completed; many organisations have adopted the program manual.
8	Advice to Industry	QS firms should engage in innovation as it would help them to respond to the pressure of CTD from clients; employers must plan well, know their projects and start on time. *"As a senior member of the profession, I am using my position to force the Institute to encourage its members to innovate and we have some relative successes in that area but we are still far behind because the bulk of our members are that lazy. They don't want to innovate anything. So, we have a lot of work to do in that respect.".*	Some staff have made seminar presentations on areas that relate to innovation in the industry.	Firm is very willing to advise the industry as demonstrated by accepting to be respondent in this research and by giving series of advice during the interview sessions.	QS firms should engage in innovation as it would help them to respond to the pressure of CTD from clients; employers must plan well, know their projects and start on time.

Pre-contract Documentation

Firm C sees pre-contract documentation as very important to the success of the entire project but notices that clients seldom consider this. All client attention is on awarding the contract. This is why there are serious problems during pre-contract and post-contract administration.

Information on Compressed Time Demands

From the experience of Firm C, almost all the projects they have been engaged on have compressed time demands in one way or the other from their clients. Since the attention of the client is on awarding the contract probably due to the budget appropriation coming late, nothing else matters other than to hasten the consultants to prepare the documentation for the award.

Causes of Compressed Time Demands

From the experience of Firm C, external factors are either the client directly requesting for compressed timeline or from the other consultants' inability to conclude their own documentation for the QS to work with. There are no internal causes in this firm as all causes are external.

Responses to Compressed Time Demands

When confronted with compressed time demands, Firm C looks for innovative strategy and in a particular case it adopted a new procurement strategy that removed officialdom and allowed the project to flow efficiently. This was done through a programme management manual that takes away discretion and authority from the Ministries and Agencies and reduced everything to something mechanical or objective. Added to this is the deployment of ICT resources that enabled the project to be delivered on time. A look at this manual shows how all activities to be executed at the pre-contract stage were itemised in detail. It requires either a YES or NO to confirm if the activity had been done or not. There is no provision for reasons on why something was not done. If a staff did not do something and it is marked NO on the manual, the duty of the next senior person is simply to get that thing done and straighten out the bottleneck.

Types of Innovation

In Firm C, innovation is both market-pull and resource-push. A market-pull innovation that the firm introduced is the executive summary in the tender report. Based on the environmental scanning and the complaints received from Chief Executives of various organisations, the firm decided to innovate the executive summary, which has been a feature of all tender reports produced by the firm. When staff attend conferences or when they are trained in some areas, this generates new ways of thinking that will consequently cause new way of doing things in the firm. This is also resource-push innovation.

Innovation Challenges

Innovation challenges are the series of action and reaction forces that drive or restrain innovation in an organisation. In Firm C, the support of management is the most important

action force that drives innovation. Also important is the enthusiasm and interest of staff in looking for a new way of doing things. Of course, the technical challenges of technological innovation like learning new software coupled with the high cost of acquiring the software are reaction forces, the interest of staff and management in innovation always ensure that such reaction forces are overcome.

Innovation Outcome

From the experience of Firm C, innovations embarked upon were successful as the pre-contract documents were delivered within the compressed time.

Advice to Industry

The advice of Firm C to QS firms is that they should embrace innovation, as it will enhance the efficiency and effectiveness of their operations. With innovation they are more likely to deliver pre-contract documents within compressed timelines within an environment that is daily putting more pressure on them to work within shorter time. Clients need to also plan well so they can commence their projects in good time to forestall the need to ask consultants to work within compressed timelines.

9.5 Case Study 4: Firm D

The results of the Case Study 4 interviews, documents and personal observation are presented and structured thematically.

9.5.1 Interview 1

Introduction

Firm D was originally established as a limited liability company and started business in 1990 but later went into merger with two other firms in 2009. With a head office in the southwest, it was registered by the NIQS and the QSRBN as a practice firm for quantity surveying and project management. With most of its clients from the private sector it has diversified into other areas of fund management and publishing.

Pre-contract Documentation

Pre-contract documentation is very crucial for the success of the entire project. It could be seen as the blueprint of the entire project. Firm D relies on the drawings of the architect and the engineers to prepare the cost plans and bills of quantities. The entire pre-contract documents convey the intention of the client and the contractual relationship to be entered into. Effective management of the pre-contract documentation process makes for a successful procurement experience.

> The pre-contract document in a nutshell is called a blueprint of what you want to develop. If you don't establish the blueprint, then you really don't have a destination of where you want to go or what you want to achieve. So the pre-contract documents are very important to put together as they depict what in essence the client is expecting to buy or procure. It also helps to formulate the contract as to the expectation that will form the basis of how to evaluate what the client is given at the end of the day.
>
> (Firm D)

Information on Compressed Time Demands

Firm D experiences compressed time demands on most of its projects especially during the pre-contract practice. While some clients give very tight schedule for the production of pre-contract documents, many architects and engineers are equally unable to provide the drawings that will enable the QS to work on the cost plans and bills of quantities. However, Firm D is unperturbed as it does all it can to ensure that the documents are delivered within the given short period. This is achieved through some innovative methods like the deployment of latest ICT resources and also through other methods like utilising the spare capacity of some former staff who have now formed themselves into an alumni of the QS firm.

> Yes, we do have that experience but I also work under many philosophies. I work under the philosophy of Parkinson's Law, which says that work will expand according to the time allotted to it. So, I believe in that too. If you've given your work and we decide on a schedule, even if it is tight, we try and match it using different methodologies or processes in trying to satisfy you because we believe in client satisfaction.
>
> (Firm D)
>
> …we have some spare capacity that we can immediately deploy to hasten our services on the project we have some reserved backup of some previous staff who would like to come and work with us on freelance basis so they

> can help in quickly setting up a project team and executing services. So, we have that capacity and it is all about capacity. If you have capacity, you can measure up.
>
> (Firm D)

Causes of Compressed Time Demands

External factors as experienced by Firm D include the inability of the client to plan well and therefore make adequate provision for each activity for the project procurement. It also includes the inability of other consultants, like the architect and engineers, to deliver their drawings and specifications on time for the QS to produce all the cost related documents. While inadequate planning on the part of client is a key element here, there is also the need for QS firms to expect the situation and strategically devise innovative or other means to addressing it. This is what Firm D does very well.

> The architect's drawings have been very crucial to our work but in all honesty, the quality of the information needs a bit to be desired on. So we end up augmenting their information.
>
> (Firm D)

> I agree with you but it is not in Nigeria alone. We've worked with international consultants. It is usually a problem for designers to conclude their deliverables within time. They overstretch the allotted time in the programme.
>
> (Firm D)

> In Nigeria it is going to be tough for the public sector not that it is not possible for them but it is basically because of their attitude, their knowledge and corruption. Personal intentions would not make things work. They would rather not want things to work in the public sector because when things work out very well, then there is no room for arbitrariness or for illegal self-enrichment, which civil servants really want.
>
> (Firm D)

Responses to Compressed Time Demands

Responses to compressed time demand take the form of innovative and other methods. Innovative methods in Firm D include the deployment of latest ICT resources like MasterBill, RIPAC and QSCAD. These resources have helped the firm to collapse time and fit into the time mould advised by the client. As stated earlier, the use of spare capacity

could be taken as other method of responding to compressed time demands even though it may also be seen as an innovative method. These people work like contractors and the advantages of using them apart from getting the job done on time is that they are already conversant with the working style of the firm and they are only paid when they are engaged thereby saving a lot of money.

> To be capable to roam these kinds of processes effectively, you need to put in modern technology in place. The first of the technology is that you need to have IT infrastructure in your office. IT infrastructure in that you can work from many points or workstations. So, it is not just a single computer, you must have a server and many workstations. To run it effectively also, you must have internet infrastructure to coordinate and also exchange information and also make your working faster. You must also have Skype facilities in order to relate and have online meetings with your co-consultants to come together. Then you must have specialised software. REVIT is the in-thing now so; you must have REVIT software in order to even read the designs of your co-consultants and probably do some work online. You don't need to print out before you measure and do your estimate. We have this special software called RIPAC produced … it is an omnibus software you can use to integrate building and civil engineering measurement and documentation.
>
> (Firm D)

> Yes, we know that usually you are given an excruciating time deadline to work; we try to work with it. … there is however no guarantee that other consultant may be able to give you quality works under such a time because it can affect quality. That is why we … try to have spare capacity at any point in time so that whenever we have a sudden work flow, we have some spare capacity that we can immediately deploy to hasten our services on the project we have some reserved backup of some previous staff who would like to come and work with us on freelance basis so they can help in quickly setting up a project team and executing services. So, we have that capacity and it is all about capacity. If you have capacity, you can measure up.
>
> (Firm D)

Types of Innovation

The types of innovation are market-pull and resource push. While market-pull innovations are those that are driven by external forces like clients, other consultants and the wider external environment, resource-push refers to those innovations that are driven by the resources of the firm, for instance, top management, staff and finance. Firm D is involved more in resource-push innovations as it takes most of the innovations in the firm as being originated from within the firm where they are then diffused.

> Like I said, it starts inwards and driven outwards to the client rather than the outwards driving us. And because of the infancy age of our construction industry, the market-based innovation is still not coming in yet.
>
> (Firm D)

> The zeal or the push for innovation is the managerial. The mind-set that things must be done in a different way; cheaper way with profitable bottom line is the managerial. If the management don't believe in it, the staff will walk away from it.
>
> (Firm D)

Innovation Challenges

Innovation challenges are the action and reaction forces that either drive or restrain innovation in an organisation. Top management is the major action force that drives innovation in the firm probably because innovation in the firm is resource-push driven. All the staff of the firm also constitute another action force driving innovation in the firm. Having been trained and having attended seminars and conferences, they are very eager to bring new ideas that will improve the effectiveness and the efficiency of their operations within the firm.

> Firstly, the head must be interested in innovation and look for it. Do research, visit other places, have a wider knowledge of the environment about what is going on. You find out about what are the changes coming up in the environment so that you make your firm to quickly latch on to the changes in the environment and you are one of the early leaders. Part of what we do here is to benchmark our practice internationally. I do attend seminars and conferences worldwide to know what are the new things, the innovations, coming up in other countries and bring that here in Nigeria so as to be among the first set of professionals to bring such a innovation into Nigeria
>
> (Firm D)

> The zeal or the push for innovation is the managerial. The mind-set that things must be done in a different way; cheaper way with profitable bottom line is the managerial. If the management don't believe in it, the staff will walk away from it. Apart from wishing it you also go out for it.
>
> (Firm D)

> Secondly, you must encourage your staff to be creative to have insight into what is going on into what they are doing and also have them come up with the creative ideas, new styles of doing things.
>
> (Firm D)

Innovation Outcome

The extent which innovation is successful is covered under innovation outcome. Firm D has been able to deliver pre-contract documents within the compressed time demanded by the clients. Apart from this, the firm has been able to initiate some innovative ideas like publishing of cost data aimed at further strengthening the practice of QS profession in Nigeria. Innovation initiatives in the firm could therefore be said to be very successful.

> For instance, the price book that we are publishing is one of the innovations we are bringing into the industry.
>
> (Firm D)

> So, we have that capacity and it is all about capacity. If you have capacity, you can measure up.
>
> (Firm D)

> If you've given your work and we decide on a schedule, even if it is tight, we try and match it using different methodologies or processes in trying to satisfy you because we believe in client satisfaction.
>
> (Firm D)

Advice to Industry

The clarion call to QS firms is that they must embrace innovation, both product and process. They also have to embrace technological innovation so as to improve the efficiency of their deliverables. As client's demands keep changing, firms that cannot innovate in meeting those demands will surely have no market to operate in sooner than later. Although ICT resources are expensive, particularly the latest software but the advantages derived from the use of these software are more than offset the high cost. Process innovation, in the way QS firms do things, is also very important in getting things done efficiently. And this includes marketing.

> Innovation is required because if you don't innovate, you are going to be dead sooner than later. Innovation is part of bringing change and change is constant in life because there must be changes. So, you must innovate and you must be conscious of innovation and bring it into your practice.
>
> (Firm D)

They must embrace change. They shouldn't fight change but many of them are fighting change. They should embrace change starting from the formation of their companies.

(Firm D)

QSs must market themselves, market their profession themselves and market their businesses. Marketing is not just advertising, it goes beyond that. Part of it is also building awareness on what your business is all about. Part of it also is creative writing and writing publications.

(Firm D)

9.5.2 Case Study 4 Summary: Firm D

Table 9.5: Thematic Matrix of Data Sources for Firm D

S/N	THEMES	INTERVIEW	DOCUMENT	OBSERVATION	ANALYST SUMMARY
1	Pre-contract Documentation	the entire pre-contract documents present the intentions of the client hence, they are very important and require effective management. "*The pre-contract document in a nutshell is called a blueprint of what you want to develop. If you don't establish the blueprint, then you really don't have a destination of where you want to go or what you want to achieve*".	correspondences between clients and QS show importance of pre-contract documents.	a number of past pre-contract documents were seen being consulted.	The entire pre-contract documents present the intentions of the client hence, they are very important and require effective management.
2	Information on CTD (Compressed Time Demand)	the firm experiences CTD on almost all its projects but confident of resolving the problem due to its innovation strategies. "*If you've given your work and we decide on a schedule, even if it is tight, we try and match it using different methodologies or processes in trying to satisfy you because we believe in client satisfaction*".	correspondences between clients, designers and QS show late receipt of design information.	interactions during the interview gave an indication of late receipt of design information.	The firm experiences CTD on almost all its projects but confident of resolving the problem due to its innovation strategies.
3	Causes of CTD	the inability of the client to plan well cause CTD; the inability of designers to make their designs available on time cause CTD. "*The architect's drawings have been very crucial to our work but in all honesty, the quality of the information needs a bit to be desired on".*	correspondences show reminders on drawings that were long overdue yet, being awaited.	interactions during the interview gave an indication of late receipt of design information.	The inability of the client to plan well cause CTD; the inability of designers to make their designs available on time cause CTD.
4	Responses to CTD	firm responds to CTD through innovative strategies; software like RIPAC, QSCAD and MasterBill are in good use; firm also uses spare capacity of alumni in some cases. *"To be capable to roam these kinds of processes effectively, you need to put in modern technology in place. The first of the technology is that you need to have IT infrastructure in your office".*	communications between software vendor and firm on operational issues indicate long-standing relationships.	lean staffing seen at head office due to the impact of ICT.	Firm responds to CTD through innovative strategies; software like RIPAC, QSCAD and MasterBill are in good use; firm also uses spare capacity of alumni in some cases.

5	Types of CTD	only resource-push innovation occur in the firm as all innovations originates from within; staff attending seminars, conferences and trainings develop the staff. *"Like I said, it starts inwards and driven outwards to the client rather than the outwards driving us. And because of the infancy age of our construction industry, the market-based innovation is still not coming in yet*".	evidence of staff attendance at innovative seminars points towards resource-push innovation.	discussions with staff show that they are well knowledgeable and empowered to be innovative.	Only resource-push innovation occur in the firm as all innovations originates from within; staff attending seminars, conferences and trainings develop the staff.
6	Innovation Challenges	top management drives innovation in this firm and this is the action force; staff of the firm constitute another action force; finance is a common reaction force. "*The zeal or the push for innovation is the managerial".*	invoices showing software annual renewal fees confirm reaction forces.	top management were seen encouraging innovation in the firm.	Top management drives innovation in this firm and this is the action force; staff of the firm constitute another action force; finance is a common reaction force.
7	Innovation Outcome	the firm has successful outcome in innovation strategies; delivered projects on time; publishes innovative cost data bank for the industry. *"So, we have that capacity and it is all about capacity. If you have capacity, you can measure up.".*	evidence of practical completion of past project confirms successful outcome.	seen working on post-contract services of successful projects that were initially affected by compressed timeline.	The firm has successful outcome in innovation strategies; delivered projects on time; publishes innovative cost data bank for the industry.
8	Advice to Industry	there is need for QS firms to embrace both process and product innovation; firms that refuse to innovate may die as they may not have customers for their services. *"Innovation is required because if you don't innovate, you are going to be dead sooner than later".*	Some staff have made seminar presentations on areas that relate to innovation in the industry.	Firm is very willing to advise the industry as demonstrated by accepting to be respondent in this research and by giving series of advice during the interview sessions.	There is need for QS firms to embrace both process and product innovation; firms that refuse to innovate may die as they may not have customers for their services.

Pre-contract Documentation

The pre-contract documentation is very important. Firm D relies on the drawings of the architect and the engineers to prepare the cost plans and bills of quantities. The entire pre-contract documents convey the intention of the client and the contractual relationship to be entered into. Effective management of the pre-contract documentation process makes for a successful procurement experience.

Information on Compressed Time Demands

Firm D experiences compressed time demands on most of its projects especially during the pre-contract practice. The firm is unperturbed about compressed pre-contract time

demands as it does all it can to ensure that the documents are delivered within the given short period. This is achieved through some innovative methods like the deployment of latest ICT resources and also through other methods like utilising the spare capacity of some former staff that have now formed themselves into alumni of the QS firm.

Causes of Compressed Time Demands

External factors as experienced by Firm D include the inability of the client to plan well and therefore make adequate provision for each activity for the project procurement. It also includes the inability of other consultants, like the architect and engineers; to deliver their drawings and specifications on time for the QS to produce all the cost related documents. While inadequate planning on the part of client is a key element here, there is also the need for QS firms to expect the situation and strategically devise innovative or other means to addressing it. This is what Firm D does very well.

Responses to Compressed Time Demands

Innovative response methods in Firm D include the deployment of latest ICT resources like MasterBill, RIPAC and QSCAD. These resources have helped the firm to collapse time and fit into the time mould advised by the client. As stated earlier, the use of spare capacity in Firm D could be taken as other method of responding to compressed time demands even though it may also be seen as an innovative response method. These people work like contractors and the advantages of using them apart from getting the job done on time is that they are already conversant with the working style and culture of the firm and they are only paid when they are engaged thereby saving a lot of money that could have been paid to them monthly if they were staff.

Types of Innovation

Firm D is involved more in resource-push rather than market-pull innovations. The firm takes most of the innovations in the firm as being originated from within the firm where they are then diffused. Examples are deployment of ICT resources and software, engagement of spare human resource capacity and publication of cost database.

Innovation Challenges

Top management is the major action force that drives innovation in Firm D probably because innovation in the firm is resource-push driven. Staff of the firm also constitute another action force driving innovation in the firm. Having been trained and having attended seminars and conferences, they are very eager to bring new ideas that will improve the effectiveness and the efficiency of their operations within the firm.

Innovation Outcome

Firm D has been able to deliver pre-contract documents within the compressed time demanded by the clients. Apart from this, the firm has been able to initiate some innovative ideas like publishing of cost data aimed at further strengthening the practice of QS profession in Nigeria. Innovation initiatives in the firm could therefore be said to be very successful.

Advice to Industry

The clarion call to QS firms is that they must embrace innovation, both product and process. They also have to embrace technological innovation so as to improve the efficiency of their deliverables. As client's demands keep changing, firms that cannot innovate in meeting those demands will surely have no market to operate in sooner than later. Although ICT resources are expensive, particularly the latest software but the advantages derived from the use of the software are more than offset the high cost. Process innovation, in the way QS firms do things, is also very important in getting things done efficiently. And this includes marketing.

9.6 Case Study 5: Firm E

The results of the Case Study 5 interviews, documents and personal observation are presented and structured thematically.

9.6.1 Interview 1

Introduction

Firm E was established in 1997 and started operation in the southwest of Nigeria. It is registered by the NIQS and QSRBN as a quantity surveying and project management firm. Presently however, it has diversified into other consulting areas like fund management. Most of the projects undertaken by Firm E come from the private sector. The firm has a total of 14 staff with 8 working at the head office and the remaining ones operating from various project sites across the country.

Pre-contract Documentation

Pre-contract documents are very important in the successful delivery of construction projects. These documents, be it the brief, drawings, schedules, conditions of contract, trade preambles or bills of quantities, they act like a blueprint that shows the client's intention and the contractual involvements. Firm E agrees that the pre-contract documents are very important hence; adequate time should be given for its production. Where the firm is being excluded as QS, for instance in preparing the brief, the firm works its way into relevance through the presentation of accurate budget, which acts as a check.

> At the pre-contract level we interact mostly with the architect to ensure that the client's project succeeds and within the budget that is put on the table. The budget has to be modified so that it will ultimately give value to the client.
>
> (Firm E)

> Often times they tend to overlook the QS roles in the briefing process. However, in our office here we work ourselves to the briefing process through our budget. But by the time we submit our budget to the client and the architect, we go out of our way to clarify the budget by looking at areas that we think are high cost centres and tying the reasons for the high cost centres to specifications and alternative designs. So with that we are now invited to look at the brief one more time.
>
> (Firm E)

> Clients need to be properly educated about the procurement process. Clients need to know that plan is very key for the execution of contracts. Clients need to know that if you spend one week extra in planning and putting documentation together properly it is going to save you 4-week extension of time on site, which is more expensive. If clients have that proper education then, they will give reasonable time to the consultants to put their documentation together
>
> (Firm E)

Information on Compressed Time Demands

Firm E agrees that it experiences compressed timelines on most of its projects throughout the procurement process particularly during the pre-contract documentation stage. Clients are always in a hurry to get the documents ready for contract formulation but time and care should be taken to get the documents ready. And the client needs to know this and factor it into a realistic pre-contract programme. The designers also provide inadequate information on their drawings most of the time and this creates more delays.

> The trend in our setting is just a lack of education of what it takes to produce a proper document … The architect would come up with what you'll refer to as preliminary drawings and this is what we use as construction drawings to produce the tender documents. But that is the system and you have no choice other than to try and get results, the limitations notwithstanding.
>
> (Firm E)

> These clients take forever to raise the money. They don't rush the banks … once it now comes to the issue of design and execution; they want to recover the time they have wasted with the banks by rushing the consultants. It is important to get the client to understand this first and foremost. The consultant also needs to let the client know that it is proper to have reasonable time to put these documents together at the pre-contract level.
>
> (Firm E)

Causes of Compressed Time Demands

Firm E sees the clients and the designers as the external causes of compressed time demands. As stated above, clients take forever to raise funds and the architects give no adequate consideration to the time requirements of the QS in preparing the bills of quantities. In the public sector, the slow budget appropriation process is a major reason why the client may be unable to prepare realistic pre-contract programme. Through proper

management of internal resources and the deployment of innovative methods like ICT the firm has been managing these demands and fulfilling the requirements.

> We have devised a system to address this because you never get these drawings from other consultants as at when you need them. In 9 out of 10 cases they eat into your time and put you under severe pressure. What we do is to insist on a kind of timetable at pre-contract and to try and establish dates, the earliest dates on which we receive drawings from architects and engineers so that when we don't get these drawings, we notify these consultants… The issue of timetable has saved a lot in keeping every person up on their toes in providing the drawings and documentation.
>
> (Firm E)

Responses to Compressed Time Demands

Responses to compressed time demands could either be through innovative ways or other ways. Innovative ways in Firm E employ new ideas, be it technological or process to respond to the challenges of compressed time demands. Such ways include the deployment of ICT and latest software, like MasterBill and QSCAD. Software has given Firm E a fantastic leverage over their competitors. Other ways that Firm E responds to compressed time demands is through the contribution of its well-trained and dedicated staff. The zeal of the staff for the firm to succeed is very high and they are always ready to put in their all-in-all to make each project a success.

> In our office here, we use the approximate quantities estimate to prepare our budget and that will be because we have software, the QSCAD software, for our measurements. And then we use the MasterBill interlinked with the QSCAD to prepare our bills of quantities. So with such software we are able generate our approximate quantities to which we apply current rates and then use it to establish our budget. So, by the time we are giving you our budget and the time we finish our bills of quantities and we price it, the difference between budget and the priced bill of quantities is usually not much because we have done quite a lot of take-off in arriving at our budget. It also helps us to accelerate the production of our bills of quantities. This is where we have strength over our contemporaries by using software.
>
> (Firm E)

> It is a herculean task. The luck that we have is that we have very dedicated members of staff. The oldest staff has been here since we established the firm while the second most senior has been here for about 15 years. With these two senior staff, we've been able to work extra hard to meet our targets with all these clients demands and limited information from the architects and engineers.
>
> (Firm E)

Types of Innovation

Innovation could either market-pull or resource-push or both. However, in Firm E, innovation is predominantly market-pull. The firm does regular environmental scanning, attends relevant workshops, conferences and seminars to understand what is in vogue in the external environment. Empowered with these information, the firm goes ahead to innovate it ways and products. In a supportive mode, the firm is also engaged in resource-push innovation by relying of its human and finance resources.

> Very correct. It is market driven. And that is why we go to seminars, workshops, conferences and exhibitions because we want to see what is the latest innovation in the market so that we can adapt ourselves or change and continue with such innovation.
>
> (Firm E)

> That is why I feel that in terms of innovation you look at the external environment and then embrace internally to catch up with what you have externally
>
> (Firm E)

> If you look at QSCAD and MasterBill as an example, that is the biggest innovation that I can refer to.
>
> (Firm E)

Innovation Challenges

These are the action and reaction forces that propel innovation or restrain it. Firm E has a number of these forces operating in the firm. Action forces range from the enthusiasm of the staff to the nodding approval of the management and the all in-between. Of importance also is that the demand for pre-contract compressed time by the client is also an action forces that induces the firm to innovate in order to resolve the tight problem. Finance is never enough and procuring expensive ICT and software resources is a potent reaction

force that constrains the ability of Firm E to innovate. The technical challenges of ICT and software, particularly as trainings have to be conducted on new releases are also reaction forces that restrain innovation.

> That is innovation, which every quantity surveyor must embrace. Whilst not detaching from your traditional way of doing things, you cannot help but align with the contemporary ways of doing things. They are faster and cheaper. That is the only way that you can add value to the services you render to the client and continue to add value to what you do.
>
> (Firm E)

> One of the big barriers is finance. That is the cost of buying the product. This is a fact and it is a very strong issue
>
> (Firm E)

Innovation Outcome

The experience of Firm E shows success in its innovative initiatives, the firm is able to respond successfully to the pre-contract compressed time demands using mainly innovative means.

> If we didn't show interest and commitment to QSCAD when we saw it, we won't have acquired the product some 15 years ago and that being the case we won't have been able to meet up with some high-profile projects that we handle now where there are time constraints. And having handled those projects within time constraints, it expanded our horizon in terms of meeting the needs of our external customers
>
> (Firm E)

Advice to Industry

According to Firm E, a strong reason why clients demand for pre-contract compressed timeline is due to lack of appropriate planning of various pre-contract activities. There is therefore the need to properly advise and inform the clients on the need to plan appropriately and on time. QS firms should upgrade and live in the moment by taking advantage of all relevant innovative resources available in the external environment. ICT and software are commonplace now as they are now sold in modules so that those firms that could not afford to buy the complete modules may, at least, buy one or two modules to start with. Those firms that fail to change may soon find out that they have no jobs again.

> Clients need to be properly educated about the procurement process. Clients need to know that plan is very key for the execution of contracts. Clients need to know that if you spend one week extra in planning and putting documentation together properly it is going to save you 4 weeks extension of time on site, which is more expensive. If clients have that proper education then, they will give reasonable time to the consultants to put their documentation together
>
> (Firm E)

> You don't live in the past. You must align with contemporary issues and innovation is about contemporary times; it is about new ideas and new products. So, the QS must consistently innovate while not losing sight of the traditional way of doing things
>
> (Firm E)

9.6.2 Interview 2

Introduction

This firm was established and incorporated by the Corporate Affairs Commission in 1997 in the southwest of Nigeria. Professionally, it is registered by the NIQS and QSRBN as a quantity surveying practice but it has now diversified into other areas of practice. The present work force of Firm E comprises of 14 professionally qualified quantity surveyors and some administrative staff. Majority of the firm's projects come from the private section but its works are spread all over the country with a significant proportion in the southern part of the country.

Pre-contract Documentation

How important is contract documentation? In Firm E, pre-contract documentation is very important because the documents produced at this stage become the blueprint of the entire procurement process. The firm sees the success or failure of the procurement to may rest entirely on the ability of the consultants to produce reliable pre-contract documents. There is therefore the need to give the consultants adequate time to produce the documents

> Our goal here is to make sure that pre-contract documentation ensures the success of every project. Once you get it wrong at the beginning, then that means that the project success is at risk. That is why when preparing budget for the client to source money or bills of quantities to go to tender, we take it very seriously. If your bills of quantities are correct and everything is ok, there will not be any problem with the project
>
> (Firm E)

> The briefing process is very important because that is where we normally get the client's thinking, what the client wants. Sometimes, clients that have dreams, some realistic while some are unrealistic. When the client gives you his brief, then you will know that yes, this is possible but that is not possible. Briefing process is very key to anything that we do from pre-contract to the post-contract.
>
> (Firm E)

Information on Compressed Time Demands

Do firms experience compressed timelines? Firm E experiences compressed time demands on many of its projects because clients, particularly on public sector projects, request that the pre-contract documentation be prepared within very short timelines. On the average, the firm is given about two weeks to produce pre-contract documents. Although this time is short, the firm has been able to deliver due to the use of innovative and other resources within the firm.

> We have so many different projects but to generalise, I would say that they give us 14 days on average, that is two weeks. Of course, we have occasions where we have been given only 7 days to prepare contract documentation.
>
> (Firm E)

> Yes. It a realistic assumption that the public sector always gives unreasonable timeframe.
>
> (Firm E)

Causes of Compressed Time Demands

The causes of compressed pre-contract time demand on projects from the experience of Firm E are external factors. External factors could be due to a direct request by the client for the pre-contract documents to be prepared within very short timelines, sometimes within seven days. It could also be due to the design consultants' inability to prepare the

drawings and specifications on time. Most architects use up the entire available time without consideration for the time requirements of the other consultants.

> We all know that in the industry especially in Nigeria, if the client allocates about 8 weeks for the pre-contract documentation, architects and engineers would use the whole 8 weeks without considering any other consultant.
>
> (Firm E)

Responses to Compressed Time Demands

Responses to compressed pre-contract time demands could either be through innovative or other methods. Firm E responds mainly through innovative methods by deploying latest ICT facilities and software to enable it deliver the pre-contract documents on time. The firm has the latest MasterBill software like QSCAD and MasterBill Elite that it uses for its projects for the preparation of cost plans, bills of quantities and estimates, which are the key pre-contract documents. There are few cases where the aforementioned response may not be adequate and where the firm may have to respond through other means. Here, the firm do use spare capacity of previous staff who now work with the firm as contractors to help deliver the documents. As previous staff, they work well and seamlessly with the firm, as they are conversant with the style of working and culture of the firm. In extreme cases however, the firm may ask for extension of time if the client may be able to give it.

> If we have to look at this firm, we have gone way above some other firms in such a way that preparing bills of quantities is not difficult for us because of the tools that we use.
>
> (Firm E)

> All we need from the architect is to give us drawing, dimensioned or not dimensioned. We load, we calibrate and we measure. By the time they are finishing their detailed drawings, our bills of quantities are ready. So we use software, different software for measurement and for bills of quantities preparation and for estimating. We have software that are linked together that can carry out these tasks for us within the shortest time possible.
>
> (Firm E)

> Yes. It is an innovative way of working and that is why we are able to achieve the timeframe given to us.
>
> (Firm E)

> Presently we majorly use MasterBill products from the UK. We are using their QSCAD for measurements. We load drawings and we measure all our quantities from it. We also use it for quick preliminary estimate to generate bills of approximate quantities that will not have standard descriptions but can have short descriptions for excavation and concrete, so that we can quickly price to have our bills of approximate quantities and generate our budget estimate. We also use MasterBill Elite, which we call MB Elite. MB Elite is like a robotic quantity surveyor from pre-contract to post-contract. So, we use it for cost planning, estimating and bills of quantities preparation.
>
> (Firm E)

> When we notice that, even with the best of efforts, the timeframe is not realistic, we either ask for time extension or we outsource some of the work that we are doing. We have support staff that are not fully employed by us. When we have deadlines that we cannot meet, then we bring them in to assist. So, we have those resources. These are the ways we have been able to shoulder the unreasonable deadline issue. It is either we outsource by bringing in our contract staff or ask for time extension from the client.
>
> (Firm E)

Types of Innovation

Innovation could be market-pull or resource-push. Market-pull innovations are those that are occasioned by external forces like clients, other consultants and the general external environments. Resource-push innovations occur due to the internal resources within the firm. This could be management support, technical operational demands, enthusiastic staff or adequate funding. Innovations in Firm E are mainly due to resource-push. This could be from a staff who has a new idea about how to improve the activities in the firm or the Champion noticing new tool or system that could be deployed. Of course, the fact that clients ask for tough short timelines could also be seen as a market-pull innovation.

> I am the champion when it comes to innovation as far as this firm is concerned. My principals are more particular about getting jobs and our own duties is to sell the innovation ideas to them.
>
> (Firm E)

> Generating ideas have to do with what we see and what we experience on our projects. We always look at how we can do something better. That is why this firm keeps on improving. If you see our documentation today, it may not be the same thing tomorrow as we learn from what we do regularly. This is continuous improvement. Once we notice something, we improve on it.
>
> (Firm E)

Innovation Challenges

Innovation challenges are the action and reaction forces that either drive or restrain innovation in a firm. Firm E has a staff that is the innovation Champion in the firm as a potent action force. Any staff could also be an action force as they also initiate innovation within the firm. The support of the management is very important as the main action force for innovation. Without the management support there cannot be any innovation. Finance and the ability to procure these innovation tools present the reaction forces to innovation in Firm E.

> I am the champion when it comes to innovation as far as this firm is concerned. My principals are more particular about getting jobs and our own duties is to sell the innovation ideas to them. By virtue of my training as an academic, I read and know about new things that are coming up. So I try to bring it to the practice.
>
> (Firm E)

> These ideas are then taken to the management for the final decision. Innovation cannot happen without the management. And that is why I said that it is like a chain that moves from the technical, people and environment until it moves to management. Management takes the final decision and the feedbacks come down again. These may be decision to buy, procure, expand and adjust.
>
> (Firm E)

Innovation Outcome

The experience of Firm E shows that the deployment of innovative means in the firm, particularly during the pre-contract documentation has been very successful. The firm has been able to deliver pre-contract documents within the requested short timelines on almost all its projects.

> Yes. It is an innovative way of working and that is why we are able to achieve the timeframe given to us
>
> (Firm E)

> I can say from experience that if it will take some traditional firms 3 weeks to deliver their pre-contract documents, I can confidently do the same in one week in our firm. That is the good thing about the software.
>
> (Firm E)

Advice to Industry

Firm E advises that the era of the traditional QS is now gone. Firms should now embrace innovation in the tools and processes that they use as it will enable them to work not only efficiently but also effectively. An innovative way of working at the pre-contract level will surely provide a platform for a smooth post-contract administration. Finally, an innovative company will always have a competitive edge in the market place.

> My advice has always been to get software that would be able to assist your pre-contract documentation. Not only pre-contract but also post-contract. It makes your work so very fast… another benefit is that your quantities are precise. For instance, no matter the shape you'll get the precise quantities of the items of work. There is no way that you'll measure a zig-zag item and get it correctly but, with the software that will trace it, you'll get precise quantities. These are the benefits which go to post-contract with our bills and no contractor can come to us to tell us that our quantities are not accurate.
>
> (Firm E)

> The traditional quantity surveying practice is being phased out… I will advise that they give attention to new innovations and not just the traditional ways of doing things. They should also start from somewhere and improve because it would give them edge when it comes to competition. As you know in Nigeria when a client, whether private or public, wants to do any project will invite up to 10 quantity surveying firms to come and compete. A firm that is innovative will always have an edge over other firms that are yet to innovate.
>
> (Firm E)

9.6.3 Case Study 5 Summary: Firm E

Table 9.6: Thematic Matrix of Data Sources for Firm E

S/N	THEMES	INTERVIEW	DOCUMENT	OBSERVATION	ANALYST SUMMARY
1	Pre-contract Documentation	pre-contract documents are very important because they act like a blueprint that shows the intention of the client; this firm works its way into the briefing section to ensure it prepares accurate pre-contract documents. *"Our goal here is to make sure that pre-contract documentation ensures the success of every project. Once you get it wrong at the beginning, then that means that the project success is at risk".*	examples of pre-contract documentation in previous projects were made available and they were seen to be prepared in details.	few past pre-contract documents were seen being consulted.	Pre-contract documents are very important because they act like a blueprint that shows the intention of the client; this firm works its way into the briefing section to ensure it gets relevant information that enables it to prepare accurate pre-contract documents.
2	Information on CTD (Compressed Time Demand)	the firm experiences CTD on most of its projects particularly on public sector projects; clients are always in a hurry even though they have wasted time by not planning appropriately. "*These clients take forever to raise the money. They don't rush the banks … once it now comes to the issue of design and execution; they want to recover the time they have wasted with the banks by rushing the consultants*".	correspondences between designers and QS show late receipt of design information.	there was no ongoing pre-contract documentation seen during the two days the interview was conducted; body language of respondents show strong confidence in what they did during previous pre-contract documentation.	This firm experiences CTD on most of its projects particularly on public sector projects; clients are always in a hurry even though they have wasted time by not planning appropriately.
3	Causes of CTD	causes of CTD are the clients and the architects; the client takes forever to raise money but puts a lot of pressure on the consultants to deliver pre-contract documents; architect forgets that there is a QS who must prepare cost. "*you never get these drawings from other consultants as at when you need them. In 9 out of 10 cases they eat into your time and put you under severe pressure".*	correspondences between designers and QS show late receipt of design information; correspondences between client and QS show late commissioning.	there was no ongoing pre-contract documentation seen during the two days the interview was conducted; body language of respondents show strong confidence in what they did during previous pre-contract documentation.	Causes of CTD are the clients and the architects; the client takes forever to raise money but puts a lot of pressure on the consultants to deliver pre-contract documents; architect forgets that there is a QS who must prepare cost.
4	Responses to CTD	firm uses massive deployment of ICT to respond to CTD; software includes MasterBill and QSCAD; firm also uses spare capacity of previous staff whenever possible. *"It is a herculean task. The luck that we have is that we have very dedicated members of staff. With these staff, we've been able to work extra hard to meet our targets with all these clients demands and limited information from the architects and engineers".*	organogram shows a near flat organisation which could allow innovative independent thinking;	open door policy and easy interaction between staff and directors clearly visible; the head office was sparsely staffed due to the deployment of ICT.	This firm uses massive deployment of ICT to respond to CTD; software includes MasterBill and QSCAD; firm also uses spare capacity of previous staff whenever possible.

5	Types of CTD	types of innovation are market-pull and resource-push; through clients' CTD and environmental scanning, market-pull innovation occur; through top management push and enthusiastic staff, resource-push innovation occur. *"Very correct. It is market driven. And that is why we go to seminars, workshops, conferences and exhibitions because we want to see what is the latest innovation in the market so that we can adapt ourselves or change and continue with such innovation*".	communications with project teams requesting quick delivery of documents confirm market-pull innovation; staff attendance at innovative seminars points towards resource push innovation.	discussions with staff show that they are well knowledgeable in how to be innovative; the use of smart phones and social media platforms in innovative ways was demonstrated.	Types of innovation are market-pull and resource-push; through clients' CTD and environmental scanning, market-pull innovation occur; through top management push and enthusiastic staff, resource-push innovation occur.
6	Innovation Challenges	there are both action and reaction forces constituting challenges; enthusiastic interest of staff and top management support are action forces; finance in procuring the software is a reaction force; technical challenges of learning a new software is also a reaction force. "*One of the big barriers is finance. That is the cost of buying the product. This is a fact and it is a very strong issue".*	invoices showing software annual renewal fees confirm reaction forces.	top management were seen encouraging innovation in the firm; support of top management is an action force.	There are both action and reaction forces constituting challenges in the firm; enthusiastic interest of staff and top management support are action forces; finance in procuring the software is a reaction force; technical challenges of learning a new software is also a reaction force.
7	Innovation Outcome	the outcome of deployments of innovative means on CTD have been successful in all the projects; the firm has been able to deliver pre-contract documents in very short timelines. *"Yes. It is an innovative way of working and that is why we are able to achieve the timeframe given to us".*	evidence of contract signing of past projects confirm successful outcome; evidence of practical completion of past project confirms successful outcome.	saw project photographs and records of past CTD projects that have been completed successfully fully displayed.	The outcome of deployments of innovative means on CTD have been successful in all the projects; the firm has been able to deliver pre-contract documents in very short timelines.
8	Advice to Industry	clients must plan appropriately and on time; QS firms should embrace innovative means in addressing CTD by investing in ICT and also organisation reforms. *"My advice has always been to get software that would be able to assist your pre-contract documentation. Not only pre-contract but also post-contract. It makes your work so very fast".*	past presentation documents seen as demonstration of advice.	Firm is very willing to advise the industry as demonstrated by accepting to be respondent in this research and by giving series of advice during the interview sessions.	Clients must plan appropriately and on time; QS firms should embrace innovative means in addressing CTD by investing in ICT and also organisation reforms.

Pre-contract Documentation

In Firm E, pre-contract documents are very important in the successful delivery of construction projects. These documents act like a blueprint that shows the client's intention and the contractual involvements. Hence, there is therefore the need to give the consultants

adequate time to produce the documents. Where the firm is being excluded as QS, for instance in preparing the brief, the firm works its way into relevance through the presentation of accurate budget, which acts as a check.

Information on Compressed Time Demands

Firm E experiences pre-contract compressed timelines on most of its projects, particularly on public sector projects. Clients are always in a hurry to get the documents ready for contract formulation but time and care should be taken to get the documents ready. On the average, the firm is given about two weeks to produce pre-contract documents. The designers too provide inadequate information on their drawings most of the time and this creates more delays. Although this time is short, the firm has been able to deliver due to the use of innovation and other resources within the firm.

Causes of Compressed Time Demands

Firm E sees the clients and the designers as the external causes of compressed time demands. Clients take forever to raise funds and are rushing to recover the time. Architects also give no adequate consideration to the time requirements of the QS in preparing the bills of quantities. In the public sector, the slow budget appropriation process is a major reason why the client may be unable to prepare realistic pre-contract programme. Through proper management of internal resources and the deployment of innovative methods like ICT the firm has been managing these demands and fulfilling the requirements.

Responses to Compressed Time Demands

Firm E responds mainly through innovative methods by deploying latest ICT facilities and software to enable it deliver the pre-contract documents on time. The firm has the latest MasterBill software like QSCAD and MasterBill Elite that it uses for its projects for the preparation of cost plans, bills of quantities and estimates, which are the key pre-contract documents. There are few cases where the aforementioned response may not be adequate and where the firm may have to respond through other means. Here, the firm do use spare capacity of previous staff who now work with the firm as contractors to help deliver the documents. As previous staff, they work well and seamlessly with the firm, as they are

conversant with the style of working and culture of the firm. In extreme cases however, the firm may ask for extension of time provided the client is able to give it.

Types of Innovation

In Firm E, innovation is both market-pull and resource-push. The firm does regular environmental scanning, attends relevant workshops, conferences and seminars to understand what is in vogue in the external environment. Empowered with these information, the firm goes ahead to innovate its ways and products. Resource-push innovations occur due to the internal resources within the firm. This could be management support, technical operational demands, enthusiastic staff or adequate funding.

Innovation Challenges

Firm E has a number of action and reaction forces operating in the firm. Action forces range from the enthusiasm of the staff to the nodding approval of the management. Of importance also is that the demand for pre-contract compressed time by the client is also an action force that induces the firm to innovate in order to resolve the tight problem. Finance is never enough and procuring expensive ICT and software resources is a potent reaction force that restrains the ability of Firm E to innovate. The technical challenges of ICT and software, particularly as trainings have to be conducted are also reaction forces that restrain innovation.

Innovation Outcome

The experience of Firm E shows that the deployment of innovative means in the firm, particularly during the pre-contract documentation has been very successful. The firm has been able to deliver pre-contract documents within the requested short timelines on almost all its projects.

Advice to Industry

According to Firm E, a strong reason why clients demand for pre-contract compressed timeline is due to lack of appropriate planning of various pre-contract activities. Therefore clients should be properly advised and informed on the need to plan appropriately and on

time. Firms should now embrace innovation in the tools and processes that they use as it will enable them to work not only efficiently but also effectively. An innovative way of working at the pre-contract level will surely provide a platform for a smooth post-contract administration. Finally, an innovative company will always have a competitive edge in the market place.

9.7 Case Study 6: Firm F

The results of the Case Study 6 interviews, documents and personal observation are presented and structured thematically.

9.7.1 Interview 1

Introduction

Firm F was established in 1990 but started practice in 1992 as a merger of two practices in the southwest of Nigeria. It started with two partners but there was a divorce early in the life of the firm that led to a sole proprietorship. Presently however, the firm has grown and now have two partners with a head office in the southwest and a subsidiary in the UK. The firm is registered by the NIQS and QSRBN to practice quantity surveying in Nigeria. With a total of 15 qualified staff, the firm undertakes only projects from private sector clients as a policy.

Pre-contract Documentation

Firm F considers pre-contract documentation as very important because the quality of the documents very often determines the success or failure of the particular project. As a consultant in the private sector, the firm goes a long way to assisting the client in the preparation or review of the brief in addition to preparing the bills of quantities and the estimate. Firm F therefore is very involved at the briefing stage and is very instrumental to all decisions taken on the project at the pre-contract stage. In order to make sure that all issues are covered, consultants should be given adequate time to prepare the pre-contract documents.

> They are quite important. Actually, the success of a contract depends on the contract documentation… But the advantages of the pre-contract documentation go through the process if the client allows it. Because at times a client comes up and say he does not have time and that money is not an issue and that he wanted to go ahead and award the contract to a contractor. For example, you cannot pay them when government notice says that if the land is not developed, it would be revoked and taken away. In that scenario, the project will have to go forward without following the normal process. We still do an estimate however and make sure that the client gets it… Because most of our tender documents are bulky, we expose everything that is going to be contractual to them and we highlight areas that there is the need to rate before the tender. So, everything is clear from day one.
>
> (Firm F)

Information on Compressed Time Demands

Firm F has many experiences on the demand for compressed timelines, which could have been caused by various factors. These reasons may involve clients not having an appropriate appreciation of what it takes to prepare the documents, government giving a matching order to client to quickly develop the land lest it be revoked. Since Firm F works exclusively for the private sector it means that the demand for pre-contract compressed timeline is not a function of the public sector alone but that it also happens in the private sector.

> Oh yes it happens… We told the client that it was impossible and that if they could get another firm that could do it within that short timeline, they should go ahead. We cannot sporadically increase our overhead because of one project which we are not even sure will go ahead after tendering process.
>
> (Firm F)

Causes of Compressed Time Demands

The experience of Firm F shows that there are few times when the client is under pressure to develop a property to avoid the revocation of the certificate of ownership or the title to the land. Of course there is no freehold title to land in Nigeria according to the Land Use Act. What one could obtain is leasehold and government at any time, for the public interest, could revoke such leasehold. This may present a genuine reason for compressed time demands by a client who wants to develop quickly. However, there are other times when the client is putting sheer pressure on the consultants because he already had his

money and could not really appreciate the volume of work inherent in pre-contract documentation. These are uninformed clients who do not have the technical support within their organisation. They are unlikely to have prepared a pre-contract programme and may sometimes not even have a brief. Architects and other design consultants also put QS firms under pressure for their inability to conclude their designs and drawings on time. To Firm F therefore, the causes of pre-contract time demand are external in nature.

> you cannot pay them when government notice says that if the land is not developed, it would be revoked and taken away. In that scenario, the project will have to go forward without following the normal process.
>
> (Firm F)

> Any client who comes in and ask us to deliver pre-contract documentation in unreasonable timeline, we know that he is not a serious investor and we won't put too much hope on him. I am just coming in from a meeting on a N30 billion project and the client wanted us to prepare the developmental estimate latest by Friday, in 2 days' time. I told him that it was impossible because we don't have the capacity to deliver it within 2 days… After the meeting I told the client that what he wanted us to do was to provide him with a costing that will show him his returns in 5 years' time but to be prepared in 2 days… I asked for his brief but he had none and he wanted developmental cost in 2 days... We later agreed that I should come over to help him develop his brief, which I know we cannot finish in a day. So by that Friday we are still working on the brief
>
> (Firm F)

Responses to Compressed Time Demands

Responses to compressed time demand could be through innovative or other methods. Firm F combines both methods in responding to compressed time demands. Firm F is a pioneer in technological innovation in the industry as it is among the first set of firms to deploy ICT in the performance of QS jobs. The firm has invested heavily in the latest QS software like MasterBill Elite and QSCAD. It is also conversant with the use of REVIT, which helps to view and understand architectural and engineering drawings. These innovative methods enable the firm to rise up, in most cases, to the demands of the client. Other methods include good management architecture and the use of spare capacity of previous staff who may now work with the firm as contractors

> So, as at that time we had invested up to £100,000.00 in software. Today, everything we do here is electronics, almost electronics, I would say except the meetings and the things we resolve among each other. So, you can work

> anywhere in the world, at home and you don't have to be in the office. You can work from home because everything is accessible.
>
> (Firm F)

> Now about 80% of our work is done on paperless basis. Because of technology, we only have a front desk officer and no secretaries or typists. The front desk officer produces the bills, he extends it and does everything. You can now send it to the printer if you want a hard copy or you can zip the soft copy and send it to the contractor. That has saved money, time and overhead. Though we have invested heavily on it, we have made the money back. So the technology has really helped us in this and other ways.
>
> (Firm F)

Types of Innovation

Innovation types are either market-pull or resource-push. Firm F is involved in market-pull innovation when its innovation is based on the demands of its customers. The request for compressed pre-contract timeline is a typical example that does engineer market-pull innovation. Internal resource of Firm F is also another source of innovation. The staff and management who attend trainings and workshops and have gained knowledge on new ways of doing things do introduce innovative ideas in the firm. Financial capacity is also an internal resource that does enable the firm procure new ICT infrastructure and software.

> Things come up and we continuously get ideas on what next to do.
>
> (Firm F)

> …just came back from a workshop, which costs us over £5,000.00. We know the income will come because we are learning. So, those are the things that I think firms should do. Once you invest in innovation, you'll see the benefits.
>
> (Firm F)

Innovation Challenges

Innovation challenges are the action and reaction forces that drive or restrain innovation in an organisation. Firm F has its top management as a strong action force that drives innovation. So also, are the staff who are very enthusiastic to try new ideas having received appropriate training. The major reaction force to innovation in this firm is finance as the cost of acquiring innovation product or process could he very huge. Another reaction force is the lack of wide embrace of innovation by the stakeholders that the Firm F works with.

For instance, the firm has been trained in building information modelling (BIM) but could not deploy it on its projects because the client, architect and engineers on those projects are yet to buy into the use of BIM.

> So, as at that time we had invested up to £100,000.00 in software.
>
> (Firm F)

> We tried to put that in it because we wanted the paperless system at work. But the downside of it is that even when we became paperless, we were working with people that still rely on paper.
>
> (Firm F)

Innovation Outcome

What is the outcome of innovation in Firm F? Evidence shows that the outcome is successful. The firm is able to, in most cases, meet the request of the clients for compressed timelines. Through its deployment of ICT infrastructure and software, Firm F has been able to considerably reduce the time it takes to produce the documents.

> That has saved money, time and overhead. Though we have invested heavily on it, we have made the money back. So, the technology has really helped us in this and other ways
>
> (Firm F)

Advice to Industry

QS firms should learn to be straight with their clients and advise them appropriately. Let the client know what is possible and what is not. It breeds trust and referrals. QS firms should invest in their management and professional staff as it brings bumper dividends. They should attend trainings on appropriate software and get engaged in lifelong learning rather than relying on old paper qualifications. QS firms should also invest in ICT and software to enable them work efficiently and effectively. Finally, quantity surveyors should endeavour to socialise, as it is a reliable way of getting new jobs and referrals.

> My advice to any quantity surveying firm is not to take a job that will be the last job that the client will give to it. There is no successful firm that did not work on referrals. We have some clients that are like family to us. We have worked for the father and we are working for all the children one by one.
>
> (Firm F)

> As a QS, why not invest in yourself? The problem with people is that they don't want to invest. That is why most of the practices die easily.
>
> (Firm F)

> The advice is to be competent in everything you do. You have to acquire it. Competency is not because you have MNIQS or MRICS. Competency is what you deliberately wish to acquire. And you are not too old to learn.
>
> (Firm F)

> The other innovation that most quantity surveyors don't normally do is that you must be social. You must make your clients your friends. You must be social to the extent that if anything is going through their head, you are the first person they will call. They will call you before their bankers and may require very diversified information. So, you have to also have friends among other professions who can give you ideas of what is happening there too. Such knowledge may be handy and combined with your core quantity surveying knowledge.
>
> (Firm F)

9.7.2 Interview 2

Introduction

The firm came into being in October 1992 as a merger of two firms. Over the years, the firm has been one of the leading firms in quantity surveying practice in Nigeria as well as in West Africa. It has also been able to expand its services to the UK where it has a sister company. The firm is registered by the NIQS and QSRBN to practise QS in Nigeria.

Pre-contract Documentation

Firm F agrees that pre-contract documentation is very important and should be given adequate time to get it done. From the experience of Firm F, compressed pre-contract time demand is also very common in the private sector just like the public sector even though it may be for different reasons. A private client may be on a race to develop a property to avoid revocation of certificate of occupancy by the State Government, who by law is the custodian of all lands within the state. The client, particularly those who do not have professionals in their employment, may equally be oblivious of the technicalities and difficulty of preparing pre-contract documents to a high standard. Without proper

education of such clients, it may be difficult for them to appreciate the timeline required by consultants for the production of those documents.

> I believe that the pre-contract stage and the documents that come out of it are of the utmost importance to the successful completion of any development because the other stages are implementation stages of the pre-contract stage. The pre-contract stage is most important as far as determining the success of the project. Because if you don't have a good pre-contract stage or you don't complete the pre-contract stage well enough, then you can't go into implementation and if you go into it you've already had problems on the path of achieving the project. So I believe that whatever you do at the pre-contract stage, the documents that come out of the pre-contract stage, are of utmost importance to the eventual success or completion of any project
>
> (Firm F)

Information on Compressed Time Demands

Firm F experiences compressed time demands from its clients on most of its projects even though the clients are in the private sector. On most of its projects, the firm do have to either use some innovative or other means like asking for an extension of time, to respond to the compressed time demands. Time is never enough and time management becomes very critical as it could affect the success of the project. Consultants in the Nigerian construction industry are always under pressure to deliver pre-contract documents.

> It happens a lot and there are two ways to resolving it. It is either the time is extended for the other consultants to be able to provide the information required or we make provisions relying on our experience for such developments and always put a caveat that this might change because some information were not available at the time.
>
> (Firm F)

> Yes, we have been under pressure to deliver pre-contract documentations under very short timelines. That is more like the usual. That is what is usually obtainable as far as this industry is concerned. We are constantly under pressure.
>
> (Firm F)

Causes of Compressed Time Demands

Causes of compressed time demands are not entirely unreasonable according to Firm F. As these clients are private developers, some of them might have asked for compressed time demand due to impending revocation of their land leasehold title. There is no freehold title to land in Nigeria according to the Land Use Act, 2004. According to this law, all land is owned by the respective State Government who may only lease it for about 99 years. Even at that, such leases may be revoked at any time for public interest, a very vague phrase that is neither here nor there. Clients may also ask for compressed pre-contract timeline due to a lack of understanding of the technicalities and difficulty involved in the preparation of pre-contract documents. Finally, QS firm m ay also need to work under compressed pre-contract timeline because the architect and/or the engineers are unable to produce the respective working drawings on time. Therefore, causes of compressed time demand are all external to the QS firm.

> It happens at about all the time. I won't generally group them as being unreasonable. Some of the time you have to see their own reasons for putting you under this pressure and wanting their works to be done or their projects to be implemented in very short or tight timelines.
>
> (Firm F)

> If as a quantity surveyor you don't push the design consultants a little more, you won't get as much as you actually require.
>
> (Firm F)

Responses to Compressed Time Demands

Firm F responds to compressed time demands either through innovative or other methods. Innovative method includes the use of ICT and software in preparing the pre-contract documents. This saves a lot of time and improves on quality of the documents. Other methods of response include the use of existing and spare labour force to improve capacity.

> It happens a lot and there are two ways to resolving it. It is either the time is extended for the other consultants to be able to provide the information required or we make provisions relying on our experience for such developments and always put a caveat that this might change because some information were not available at the time.
>
> (Firm F)

> I would say for us, rather than tools, it is resources. We have the human resources and we've been able to build capacity and when we require such, we are also able to deploy our resources into the particular development where we have tight deadline for submission
>
> (Firm F)

> We have a database, which makes it very easy for us to easily come up with ideas that are needed for different projects. Most projects are not the same but we are able to deploy the technology we have in terms of software.
>
> (Firm F)

Types of Innovation

Innovations are classified into market-pull or resource-push. Firm F experiences market-pull innovation when the clients or customers induce the innovation. The request for compressed timelines by the client, which enables the consultants to look for new ideas to satisfying the request, is an example of market-pull innovation. Also due to the enthusiasm of the labour force and the supportive role of the management, innovative ideas like the development of special formulated preliminary estimates are developed and applied in getting the documents ready on time.

> We have people who have worked in this firm and have left and to work in countries like Canada and we still maintain relationship with them to know how things are done over there because we don't want to be left behind and we want to, in a matter of some years, have proper international recognition as well.
>
> (Firm F)

> As a way of being innovative, we don't do the superficial estimate anymore as they don't work for us again rather, we've developed our own system of estimate, which we formulated from the RIBA and RICS procedures and we normally call it the Budget Cost/Cost Plan Level 1.
>
> (Firm F)

Innovation Challenges

Innovation challenges are the action and reaction forces, which either drive or restrain innovation in the firm. Management support is an action force in Firm F and the innovation champion in the firm is the Principal Partner. Without the management support, no innovation can take place. The enthusiasm of the staff of Firm F towards innovation is also

an action force that drives innovation. Existing staff are motivated and young ones are encouraged to be innovative. The high cost of ICT and software makes finance a reaction force in technological innovation. The time taken to learn a new technology is also a reaction force.

> The innovation champion is the principal partner. At his age he is still well aware and very passionate about the profession. So he stays abreast of innovations, new ideas and he is always equipping himself. When somebody at the helm of affairs does that, why would you say you are not doing the same as a staff
>
> (Firm F)

> What we do here basically is that we give opportunities to young quantity surveyors. We don't have them taken for granted. We give them freehand to come up with ideas, listen to what is going on outside, what their friends are doing in other companies and financial institutions. Not only in quantity surveying firms because people work as quantity surveyors in other firms that are not quantity surveying firms. What do those quantity surveyors do there? We'd like to know.
>
> (Firm F)

> We've invested so much in technology and I make bold to say that as of today we've invested between 50 and 100 million naira on software. They don't see them probably because they are not bogus and they are not big severs. But they come very costly and we 've invested a lot in software and technology generally.
>
> (Firm F)

Innovation Outcome

Through innovation, Firm F has been able to deliver the pre-contract documents on time so, innovation outcomes in this firm have been successful.

> So, we've been able to use technology as well as the experience of the firm as the leverage to deliver within set deadlines.
>
> (Firm F)

> But we've been able to overcome these pressures. Like I said earlier, we always deploy what we call our resources: technology, human resources as well as the experience of the firm.
>
> (Firm F)

Advice to Industry

Firm F advises QS firms, particularly the young ones, to focus more on building veritable and strong firms through the acquisition of the relevant technological tools that will enable the firms to perform efficiently and effectively. Profits will come later. QS firms should also collaborate to form large firms, which will then have the financial muzzle to be able to acquire the technological tools and systems required for world-class performance.

> With my little experience, I would advise that practices and, may be up and coming practices, to invest initially in technology, building human capacity, having varying experiences and not particular about making profit out of the practice. At the start, what you should try to do is to build a practice that can stand the test of time.
>
> (Firm F)

> And maybe something we've not been doing here, practices need to start collaborating more in Nigeria otherwise a lot of our major projects would be taken by the foreign practices who are bigger than most of the practices that we have in Nigeria. And if you look at those foreign firms, they may have up to 25 partners but in Nigeria, we only have one sole owner. So, I would advise that we begin to look at collaborating with each other, partnering and forming bigger and more sustainable practices rather than the kind of practices that also tend to fade away with the proprietors
>
> (Firm F)

9.7.3 Case Study 6 Summary: Firm F

Table 9.7: Thematic Matrix of Data Sources for Firm F

S/N	THEMES	INTERVIEW	DOCUMENT	OBSERVATION	ANALYST SUMMARY
1	Pre-contract Documentation	the quality of documents very often determines the success or failure of a project hence, pre-contract documentation is very important; this firm is very involved at the brief stage and is instrumental to all decisions taken at the pre-contract stage; firm consults for private sector client only. "I *believe that the pre-contract stage and the documents that come out of it are of the utmost importance to the successful completion of any development.*"	correspondences between clients and QS show urgency and importance of pre-contract documents.	a number of past and current pre-contract documents seen being consulted.	The quality of documents very often determines the success or failure of a project hence, pre-contract documentation is very important; this firm is very involved at the brief stage and is instrumental to all decisions taken at the pre-contract stage; firm consults for private sector client only.
2	Information on CTD (Compressed Time Demand)	this firm that works exclusively for private sector clients also experiences CTD on its projects although for different reasons. "*Yes, we have been under pressure to deliver pre-contract documentations under very short timelines. That is more like the usual. That is what is usually obtainable as far as this industry is concerned. We are constantly under pressure.*".	correspondences between clients, designers and QS show late receipt of design information.	interactions during the interview gave an indication of late receipt of design information.	This firm that works exclusively for private sector clients also experiences CTD on its projects although for different reasons.
3	Causes of CTD	CTD happens because clients do not have appropriate appreciation of what it takes to prepare pre-contract documents; pressure to revoke land title also cause clients to put pressure on consultants; architects and other designers also put QS under pressure by not providing relevant designs on time. *"If as a quantity surveyor you don't push the design consultants a little more, you won't get as much as you actually require".*	correspondences show reminders on drawings that were long overdue yet, being awaited.	interactions during the interview gave an indication of late receipt of design information.	CTD happens because clients do not have appropriate appreciation of what it takes to prepare pre-contract documents; pressure to revoke land title also cause clients to put pressure on consultants; architects and other designers also put QS under pressure by not providing relevant designs on time.

4	Responses to CTD	when confronted with CTD the firm responds through innovative strategies; deployment of ICT complete with necessary software is an innovative strategy; the use of spare capacity of ex-staff is another innovative strategy. *"We have a database, which makes it very easy for us to easily come up with ideas that are needed for different projects. Most projects are not the same but we are able to deploy the technology we have in terms of software".*	communications that show that this firm is the sole agent in Nigeria of an international software vendor confirm long-standing use of relevant software.	lean staffing seen at head office due to the impact of ICT.	When confronted with CTD the firm responds through innovative strategies; deployment of ICT complete with necessary software is an innovative strategy; the use of spare capacity of ex-staff is another innovative strategy.
5	Types of CTD	innovation in the firm are both market-pull and resource-push; CTD by clients is an example that bring about market-pull innovation; staff attending seminars, conferences and trainings develops the staff and engenders resource-push innovation. *"just came back from a workshop, which costs us over £5,000.00. We know the income will come because we are learning. So, those are the things that I think firms should do. Once you invest in innovation, you'll see the benefits*".	communications with project teams requesting for quick delivery of document confirm need for market pull innovation; evidence of staff attendance at innovative seminars points towards resource-push innovation.	discussions with staff show that they are well knowledgeable and empowered to be innovative.	Innovations in the firm are both market-pull and resource-push; CTD by clients is an example that bring about market-pull innovation; staff attending seminars, conferences and trainings develops the staff and engenders resource-push innovation.
6	Innovation Challenges	management support is the most important action force that drives innovation in the firm; enthusiasm of staff in looking for new ways is another action force; technical challenges of learning a new software is a reaction force; high cost of software is another reaction force; the reluctance of other members of the design team to embrace BIM is another reaction force. "*So, as at that time we had invested up to £100,000.00 in software".*	invoices showing high cost of software confirm reaction forces.	top management were seen encouraging innovation in the firm; support of top management is an action force.	Management support is the most important action force that drives innovation in the firm; enthusiasm of staff in looking for new ways is another action force; technical challenges of learning a new software is a reaction force; high cost of software is another reaction force; the reluctance of other members of the design team to embrace BIM is another reaction force.
7	Innovation Outcome	successful in the use of innovative techniques to respond to CTD; most pre-contract documentations were completed; using ICT extensively, the firm has been able to reduce the time required for preparing pre-contract documentation. *"That has saved money, time and overhead. Though we have invested heavily on it, we have made the money back. So, the technology has really helped us in this and other ways".*	evidence of contract signing of past projects confirm successful outcome; evidence of practical completion of past project confirms successful outcome.	seen working on post-contract services of successful projects that were initially affected by compressed timeline.	The firm is successful in the use of innovative techniques to respond to CTD; most pre-contract documentations were completed; using ICT extensively, the firm has been able to reduce the time required for preparing pre-contract documentation.

8	Advice to Industry	QS firms should be straight with their clients by letting the clients know what is possible and what is not; QS firms should invest in both top management and other staff as it brings dividends; QSs should socialise as many commissions can come through socialising; Clients should plan appropriately; clients must plan well, know their projects and start on time. *"As a QS, why not invest in yourself? The problem with people is that they don't want to invest. That is why most of the practices die easily".*	Some staff have made seminar presentations on areas that relate to innovation in the industry.	Firm is very willing to advise the industry as demonstrated by accepting to be respondent in this research and by giving series of advice during the interview sessions.	QS firms should be straight with their clients by letting the clients know what is possible and what is not; QS firms should invest in both top management and other staff as it brings dividends; QSs should socialise as many commissions can come through socialising; Clients should plan appropriately; clients must plan well, know their projects and start on time.

Pre-contract Documentation

Firm F considers pre-contract documentation as very important because the quality of the documents very often determines the success or failure of the particular project. As a consultant in the private sector, the firm goes a long way to assisting the client in the preparation or review of the brief in addition to preparing the bills of quantities and the estimate. Firm F therefore is very involved at the briefing stage and is very instrumental to all decisions taken on the project at the pre-contract stage. In order to make sure that all issues are covered, consultants should be given adequate time to prepare the pre-contract documents.

Information on Compressed Time Demands

Firm F has many experiences on the demand for compressed timelines, which could have been caused by various factors. These reasons may involve clients not having an appropriate appreciation of what it takes to prepare the documents, government giving a matching order to client to quickly develop the land lest it be revoked. Since Firm F works exclusively for the private sector it means that the demand for pre-contract compressed timeline is not a function of the public sector alone but that it also happens in the private sector.

Causes of Compressed Time Demands

The experience of Firm F shows that there are few times when the client is under pressure to develop a property to avoid the revocation of the certificate of ownership or the title to the land. However, there are other times when the client is putting sheer pressure on the consultants because he already had his money and could not really appreciate the volume of work inherent in pre-contract documentation. These are uninformed clients who do not have the technical support within their organisations. Architects and other design consultants also put QS firms under pressure by not giving the QS the relevant designs and drawings on time. To Firm F therefore, the causes of pre-contract time demand are external in nature.

Responses to Compressed Time Demands

Firm F responds to compressed time demands either through innovative or other methods. Innovative method includes the use of ICT and software in preparing the pre-contract documents. This saves a lot of time and improves on quality of the documents. Other methods of response include the use of existing and spare labour force to improve capacity.

Types of Innovation

Firm F is involved in market-pull innovation when its innovation is based on the demands of its customers. The request for compressed pre-contract timeline is a typical example that engineers market-pull innovation. Internal resource of Firm F is also another source of innovation. The staff and management who attend trainings and workshops and have gained knowledge on new ways of doing things do introduce innovative ideas in the firm. Financial capacity is also an internal resource that does enable the firm procure new ICT infrastructure and software.

Innovation Challenges

Firm F has its top management as a strong action force that drives innovation. So also, are the staff who are very enthusiastic to try new ideas having received appropriate training. The major reaction force to innovation in this firm is finance as the cost of acquiring innovation product or process could he very huge. The inability of the other consultants to

embrace BIM is another reaction force to innovation. The time taken to learn a new technology is also a reaction force.

Innovation Outcome

Evidence shows that the innovation outcome in Firm F is successful. The firm is able to, in most cases, meet the request of the clients for compressed timelines. Through its deployment of ICT infrastructure and software, Firm F has been able to considerably reduce the time it takes to produce the documents.

Advice to Industry

QS firms should learn to be straight with their clients and advise them appropriately. Let the client know what is possible and what is not. It breeds trust and referrals. QS firms should invest in their management and professional staff as it brings bumper dividends. They should attend trainings on appropriate software and get engaged in lifelong learning. QS firms should also invest in ICT and software to enable them work efficiently and effectively. QS firms should also collaborate to form large firms, which will then have the financial muzzle to be able to acquire the technological tools and systems required for world-class performance. Finally, quantity surveyors should endeavour to socialise, as it is a reliable way of getting new jobs and referrals.

CHAPTER TEN

10.0 ANALYSIS AND DISCUSSION

10.1 Introduction

With a total of six cases, there is need to do a cross-case analysis in order to compare and contrast the results of the cases and create new knowledge occasioned by such comparisons. Such comparisons would highlight where the cases take the same position, where they differ and where they conflict. This chapter therefore thematically presents the cross-case analysis and it is in line with the intention of the study's research design in Figure 6.3 (p. 92). As the innovation process model was developed from existing literature, there is need to validate it through the cases. The validation of the innovation process model using the six case studies is subsequently carried out.

10.2 Cross-Case Analysis

Table 10.1: Thematic Matrix and Cross-Case

S/N	THEMES	SUMMARY FOR FIRM A	SUMMARY FOR FIRM B	SUMMARY FOR FIRM C	SUMMARY FOR FIRM D	SUMMARY FOR FIRM E	SUMMARY FOR FIRM F
1	Pre-contract Documentation	Pre-contract document seen as very important; improper documentation leads to problems; early preparation is necessary.	Pre-contract documents have considerable impacts on time and cost hence, it is very important; the probability of project failure increases when pre-contract documentations are not well prepared; enables bidders to tender on the same basis thereby making bid evaluation easy.	Although pre-contract documentation is very important, clients seldom consider this; most of the time clients' attention are on awarding contracts without paying attention to what have to be done before the award; this brings a lot of problems during post-contract administration.	The entire pre-contract documents present the intentions of the client hence, they are very important and require effective management.	Pre-contract documents are very important because they act like a blueprint that shows the intention of the client; this firm works its way into the briefing section to ensure it gets relevant information that enables it to prepare accurate pre-contract documents.	The quality of documents very often determines the success or failure of a project hence, pre-contract documentation is very important; this firm is very involved at the brief stage and is instrumental to all decisions taken at the pre-contract stage; firm consults for private sector client only.

2	Information on CTD (Compressed Time Demand)	Late receipt of brief and data put pressure on QS; QS experiences CTD on all projects; CTD from clients and designers.	Firm experiences CTD frequently on its projects; clients never allowed adequate time to prepare the documents.	CTD happens on almost all projects engaged upon by the firm; CTD is widespread; since clients are only concerned with awards, they exert utmost pressure on consultants to produce the pre-contract documents.	The firm experiences CTD on almost all its projects but confident of resolving the problem due to its innovation strategies.	This firm experiences CTD on most of its projects particularly on public sector projects; clients are always in a hurry even though they have wasted time by not planning appropriately.	This firm that works exclusively for private sector clients also experiences CTD on its projects although for different reasons.
3	Causes of CTD	Delays in taking actions cause CTD; no early involvement of QS in decision; poor design information at early stage; late budget appropriation.	There are both external and internal causes of CTD; some clients just feel that they can ask for documentation at any time they like; fulfilling some Procurement Act stipulated mandatory requirements like advertisement may also cause delays and CTD; lack of planning causes delays and CTD; other causes of CTD are late receipt of design information and late budget appropriation.	Causes of CTD are from external factors of either the clients requesting for it or design consultants' inability to conclude their designs on time.	The inability of the client to plan well cause CTD; the inability of designers to make their designs available on time cause CTD.	Causes of CTD are the clients and the architects; the client takes forever to raise money but puts a lot of pressure on the consultants to deliver pre-contract documents; architect forgets that there is a QS who must prepare cost.	CTD happens because clients do not have appropriate appreciation of what it takes to prepare pre-contract documents; pressure to revoke land title also cause clients to put pressure on consultants; architects and other designers also put QS under pressure by not providing relevant designs on time.
4	Responses to CTD	Firm responds to CTD through innovative techniques of organisation structuring, ICT and overlapping of project phases.	QS use the tools and techniques available to respond to CTD; firm thinks ahead to find innovative way to respond on project by project basis; innovative ways involve the use of ICT and the overlapping of the procurement process where necessary.	When confronted with CTD the firm responds by looking for innovative strategies; adopting a procurement strategy that eliminates officialdom; deployment of ICT.	Firm responds to CTD through innovative strategies; software like RIPAC, QSCAD and MasterBill are in good use; firm also uses spare capacity of alumni in some cases.	This firm uses massive deployment of ICT to respond to CTD; software includes MasterBill and QSCAD; firm also uses spare capacity of previous staff whenever possible.	When confronted with CTD the firm responds through innovative strategies; deployment of ICT complete with necessary software is an innovative strategy; the use of spare capacity of ex-staff is another innovative strategy.

5	Types of CTD	Innovation in the firm are both market pull and resource push; both types of innovation are not mutually exclusive but complementary.	Clients' CTD is a market-pull type of innovation and it is predominant in this firm; resource-push innovation happens at times in this firm; resource-push occurs when already trained staff try to demonstrate what they have learned during training.	Market-pull and resource-push; creating executive summary in a tender report was a market-pull innovation of the firm in Nigeria; staff attending seminars, conferences and trainings develop the staff and engender resource-push innovation.	Only resource-push innovation occur in the firm as all innovations originates from within; staff attending seminars, conferences and trainings develop the staff.	Types of innovation are market-pull and resource-push; through clients' CTD and environmental scanning, market-pull innovation occur; through top management push and enthusiastic staff, resource-push innovation occur.	Innovations in the firm are both market-pull and resource-push; CTD by clients is an example that bring about market-pull innovation; staff attending seminars, conferences and trainings develops the staff and engenders resource-push innovation.
6	Innovation Challenges	Action and reaction forces present challenges; action forces are client demand; reaction forces are high cost of software and technical challenges of learning new software.	The small size nature of the firm is a challenge to innovation as bigger firms are able to muster the financial power to provide necessary tools for innovation; constant training of staff and the support of top management are the top two action forces that enhance innovation in the firm.	Management support is the most important action force that drives innovation in the firm; enthusiasm of staff in looking for new ways is another action force; technical challenges of learning a new software is a reaction force; high cost of software is another reaction force.	Top management drives innovation in this firm and this is the action force; staff of the firm constitute another action force; finance is a common reaction force.	There are both action and reaction forces constituting challenges in the firm; enthusiastic interest of staff and top management support are action forces; finance in procuring the software is a reaction force; technical challenges of learning a new software is also a reaction force.	Management support is the most important action force that drives innovation in the firm; enthusiasm of staff in looking for new ways is another action force; technical challenges of learning a new software is a reaction force; high cost of software is another reaction force; the reluctance of other members of the design team to embrace BIM is another reaction force.
7	Innovation Outcome	Firm is successful in the use of innovative techniques to respond to CTD.	Innovation outcome is successful in the firm; successful in the use of innovative techniques to respond to CTD.	Firm is successful in the use of innovative techniques to respond to CTD; all projects were completed, many organisations have adopted the program manual.	The firm has successful outcome in innovation strategies; delivered projects on time; publishes innovative cost data bank for the industry.	The outcome of deployments of innovative means on CTD have been successful in all the projects; the firm has been able to deliver pre-contract documents in very short timelines.	The firm is successful in the use of innovative techniques to respond to CTD; most pre-contract documentation were completed; using ICT extensively, the firm has been able to reduce the time required for preparing pre-contract documentation.
8	Advice to Industry	Clients must provide early and clear briefs, speed up budgetary	Clients must provide early and clear briefs and speed up budgetary	QS firms should engage in innovation as it would help them to	There is need for QS firms to embrace both process and product	Clients must plan appropriately and on time; QS firms	QS firms should be straight with their clients by letting the clients know

		process and provide design information on time; QS must engage ICT, BIM and practice-based research.	process; client can engage a different consultant to do this for her. QS to properly scan the environment and read wide to know what is in vogue; QS to embrace ICT and other multidisciplinary areas.	respond to the pressure of CTD from clients; employers must plan well, know their projects and start on time.	innovation; firms that refuse to innovate may die as they may not have customers for their services.	should embrace innovative means in addressing CTD by investing in ICT and also organisation reforms.	what is possible and what is not; QS firms should invest in both top management and other staff as it brings dividends; QSs should socialise as many commissions can come through socialising; Clients should plan appropriately; clients must plan well, know their projects and start on time.

Pre-contract Documentation

All the six firms consider pre-contract documentation as very important in the procurement process although for what initially appear to be different reasons. Whereas Firms A, D and E see the importance of pre-contract documentation from the perspective that clients may not really know what they wanted hence they needed the consultants to help them put this together in the pre-contract documents, Firms B, C and F see the importance from the perspective that it ensures all bidders to tender on uniform basis. These different reasons could however be seen as complementary, like two sides of a coin, because when project intentions are well communicated, ambiguities are likely to be removed and vendors may then be able to provide offers that align closely to the client's project intentions. This could result in very competitive offers with its attendant reduction in price and perhaps assurance of value for money. Pre-contract documentation could therefore be seen as the medium for veritable communication and understanding of project intentions towards ensuring value for money. Sadly, though, all the interviewees contend that clients, particularly in the public sector, seldom pay the deserved attention to pre-contract documentation.

Information on Compressed Time Demands

The experiences of the six firms show that all of them have encountered compressed time demands on projects mainly from their clients. The differences are only in the frequencies of such experiences. While most of the firms (Firms B, C, D, E, F) experience it very often

on their projects, Firm A confirms experience on all its projects without any exception. None of the firms describe their experiences as sparingly or rarely hence, this could be indicative of the seriousness of the issue of compressed time demand on construction projects in Nigeria. Firms A and E also confirm experiencing compressed time demands from the architect or other designers too. In all the firms however, it was also noted that since quantity surveying firms are usually the last of the consultants to receive necessary data for the preparation of pre-contract documents, they are more likely to be under severe pressure of compressed time demands, than the other consultants, for the preparation of pre-contract documents.

Causes of Compressed Time Demands

All the firms agree that compressed time demands are usually caused by two major stakeholders: the clients and the designers. They contend that sometimes the designers (architects and engineers), through delays in concluding the designs and producing the relevant drawings, make it impossible for the quantity surveyor to access relevant design information on time for the production of the bills of quantities and other pre-contract documents. When this happens, the quantity surveying (QS) firm would have no option than to work under compressed timelines so as to meet the deadlines. It is however surprising to note that none of the firms feel that the performance of QS duties may also be a potential cause of delays just like that of design consultants.

Firms A, B, C, D and E agree that the key actions on the part of the clients, which cause delays and provide the platform for compressed time demands are poor appreciation of the pre-contract timeline, procrastination until the 11th hour or what is called the *fire brigade approach* in Nigeria, inadequate and delayed brief and late budget appropriation by the National Assembly. However Firm F, with exclusive experience from the private sector, argues that the pressure to develop an acquired land to avoid revocation of the title and having sufficient funds to commence immediately without further delays are the main reasons why clients demand compressed timeline for pre-contract documentation production. It is therefore important to note the differences in the opinions of firms that work mostly for public sector and those that work exclusively for the private sector. Issues of procrastination, budget appropriation and delayed or inadequate brief which seem to strongly affect public sector projects appear to be insignificant on private sector projects. However, private sector projects do experience compressed pre-contract time demands due

to different and sometimes contrary reasons of possession of the required funds and the need to urgently develop to avoid revocation of land title.

Responses to Compressed Time Demands

The consensus of the six firms is that innovation is central to the responses of QS firms to compressed time demands during pre-contract documentation. The firms adopt one innovative way or the other to respond to compressed time demands. All the firms are involved in the deployment of information and communication technology (ICT) to help in the quantification, collation, production and presentation of pre-contract documents. They contend that ICT, which involves the use of computer and sophisticated application software like MasterBill, CATO pro, RIPAC, QSCAD and COSTX allow time to be collapsed while quality is at the same time enhanced. Furthermore, all the firms are engaged in one form of innovative organizational restructuring or the other. While Firms A and C adopt the flat organizational structure, Firm D, E and F innovatively use the spare capacity of previous staff as and when needed. Innovative organizational structures enhance devolution of power, facilitate faster decision making and ensure operational efficiency instead of the traditional hierarchical structures that foster bureaucratic and centralised command and control system (Johnson and Scholes, 1999).

Finally, Firm A is unique in adopting the innovative overlapping of project phases. For instance, overlapping the design and tendering phases whereby tendering could commence even though design is yet to be concluded. This is the use of fast-track management system even within the traditional procurement system and may therefore require the operation of a special structure for teamwork and collaboration and the use of information release schedules. It is therefore clear that for QS firms to achieve efficiency and effectiveness within the context of compressed time demands, they should be willing to go the extra mile of adopting innovative approaches rather than depending on the conventional way of doing things.

Types of Innovation

There is a general consensus among the firms on the types of innovation in QS firms, which they generally classified as market-pull and resource-push. This is also in agreement with literature (Barrett *et al.,*2008). Market-pull innovations are innovations occasioned by

the request/need of clients and other stakeholders. These are external in nature and include compressed time demand, the need to work in certain ways or using certain tools or facilities for the deliverables. Resource-push innovations are innovations that occur due to the ability of the firms to decide to innovate without any external pressure. Issues like staff or management decisions to change the way they do things and making it more effective and efficient come under this category. Financial capability of the firm is therefore a great enabler for resource-push innovation. With the exception of Firm D, all other firms (Firms A, B, C, E and F) consider market-pull innovation as the primary source of innovation in their respective firms. Firm D considers resource-push innovation as the primary source of innovation and contends that before any request from the market/external environment, the internal system in the company would have identified the need. This appears to be a unique marketing strategy for the firm. However, all the six firms agree that both market-pull and resource-push innovations in their firms are complementary and not mutually exclusive.

Innovation Challenges

All the six firms classify innovation challenges into two separate sets of forces, action and reaction, which either support or restrain innovation in their respective firms. This is also in line with literature which classify innovation challenges as either action or reaction forces (Lewin, 1943; Lewin 1958; Barrett *et al.,* 2008). While all the firms classify finance as a reaction force, which restrain innovation particularly in small firms, due to the continuous struggle in obtaining adequate funds needed to innovate, they however see the request for compressed timeline by the client as an action force that supports or engenders innovation. It therefore appears that, in a way, compressed time demand, which puts a lot of pressure on QS firms, may actually be an enabler of innovation if viewed properly.

Other restraining forces agreed to by all the firms are technical challenges and these are directly linked to the ability of staff to embrace the new way of working, which may be an action force when embraced and a reaction force when not embraced. While Firms B, C, D, E and F consider management support as the most important action force and finance as the most important reaction force, Firm A is silent on the severity of the forces and rather appears to gives an equal importance to each force. Firm F, which has achieved a measure of building information modelling (BIM) compliance among the sample of six, is the only firm that recognises the lack of embracement of BIM by other consultants (architects and engineers) as a reaction force that prevents interoperability and seamless coordination

among consultants and other stakeholders. Firm F pointed out that it may be pointless for a QS firm to acquire BIM competences while the architectural and engineering firms they work with have not.

Innovation Outcome

The six firms confirm successful outcomes when they applied innovative techniques in responding to compressed time demands on their projects. Each firm was able to complete pre-contract documentation within the compressed time. The various types of innovative techniques used include responsive organisational structures that cut out bureaucracy and enable decisions to be taken and action commenced within the shortest time, the deployment of ICT infrastructure complete with the relevant QS software to significantly save a lot of time on routine activities and overlapping of design and tendering phases to achieve a fast-track procurement.

Advice to Industry

Advice from the six firms to the industry bifurcates into two main streams: the first is to QS firms and the second to the clients/employers. On each stream however, the six firms ardently agree on what the industry should do. For instance, they all assert that QS firms should embrace and invest in ICT infrastructure particularly in the latest QS software. QS firms should also comprehensively embrace BIM and the digital construction agenda. Furthermore, they should invest in the training of their staff and encourage them to attend relevant conferences, workshops and training seminars. Finally, QS firms should engage in continuous improvement. On the other stream, the firms agree that clients/employers should strive to provide clear and understandable briefs. Clients should plan appropriately and incorporate budgetary appropriation delays in their respective plans. Finally, clients should ensure that the architect and other designers do not appropriate the whole time available for the pre-contract documentation to themselves at the expense of the QS.

In addition, Firm B advises QS firms to embrace more of infrastructure projects outside the building sector. Firm B contends that infrastructure projects are significantly advanced in the innovation of fast-track procurement practices hence the experience gained on infrastructure projects may rub on and improve practices in the building sector. Also, Firm F advises QS firms to let clients know what is possible and what may not be possible, even

as they strive to actualise the demands of the clients. At the end of the day, according to Firm F, not every compressed timeline is achievable hence; it would be appropriate for the QS firm to let the client know about the existing challenges at inception.

10.3 Validation of Innovation Process Model

The validation of the innovation process model will depend on the ontological and epistemological positioning of the study. This is established in Chapter 6 as *idealism* and *social constructivism*. From a social constructivist approach, the case is seen in context and may not be generalised as in a quantitative study (Glaser and Strauss, 1967) but can be *transferred* into other contexts to see if it fits with those contexts on an individual or contextual basis (Lincoln and Guba, 1985; Moriceau, 2010). If it fits into other contexts, then the model could be said to have met the *transferability* conditions as proffered by Lincoln and Guba (1985) and Moriceau (2010). Figure 10.1 shows the structure of the validation process with the innovation process model sitting at the centre surrounded by the six case studies. Each case study is divided into the following four interlocking circles representing the major categories of the innovation process model.

1. Shocks/Stimuli on the steady state
2. Optional trajectories
3. Action and reaction forces
4. Resultant steady state

Each and every category of the Innovation Process Model is transferred into each case to see if it meets the conditions of transferability. This process is repeated for every case study as discussed within the four thematic categories in subsection 10.3.1-10.3.4.

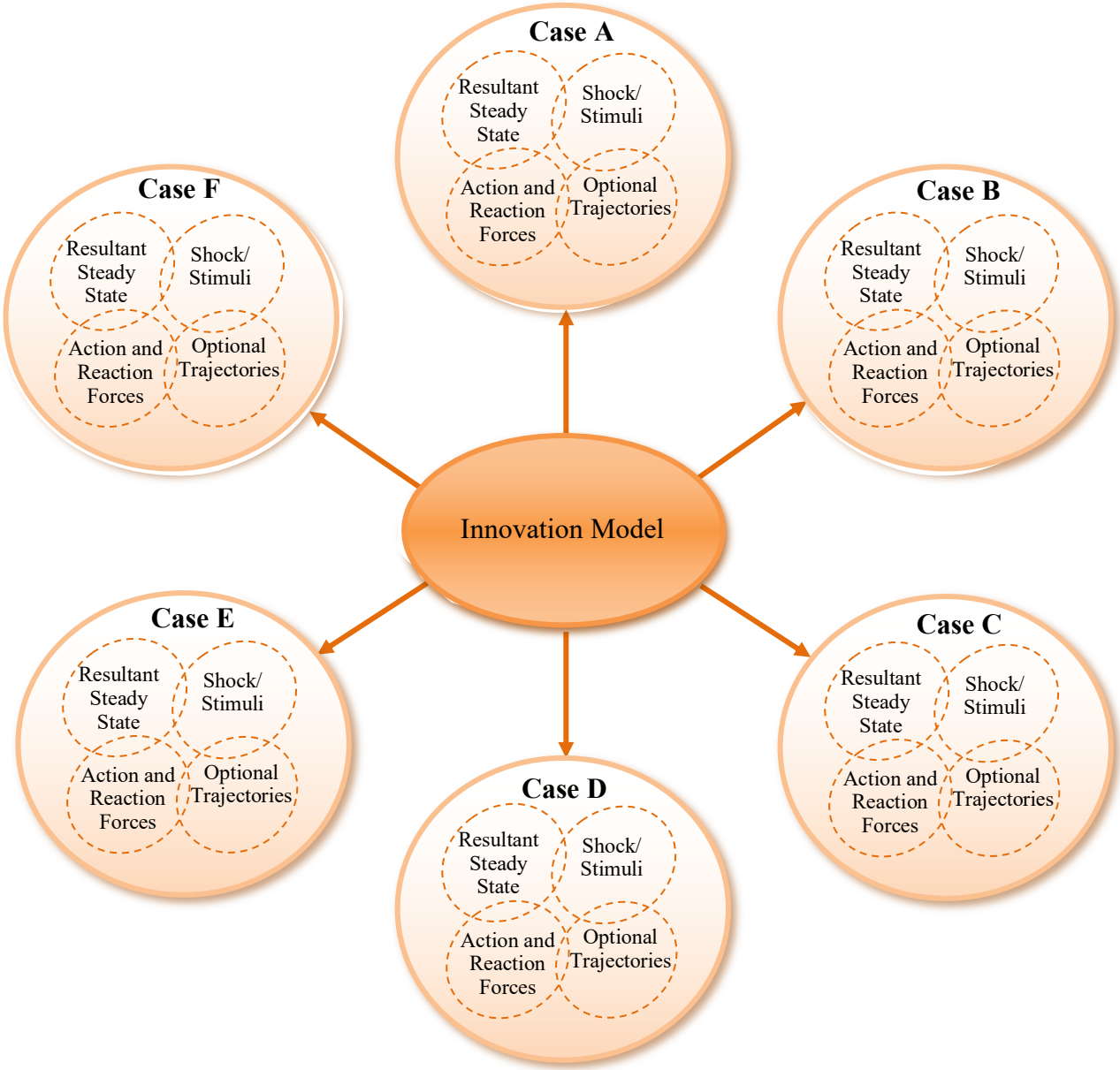


Figure 10.1: Transferability (Validation of Innovation Model) [After Glaser and Strauss (1967); Lincoln and Guba (1985); Moriceau (2010)]

Key to Figure 10.1:

Interlocking circle representing each of the four parts of the model to be validated.

Arrow connecting the theoretical model to each case study.

10.3.1 Shocks/Stimuli on the Steady State

Both literature and the innovation process model contend that organisations are averse to change and tend to, as much as possible, maintain the status quo which Bessant, *et al*. (2005) call "relative stability". This relative stability state is referred to as the steady state as shown on the X-axis of the innovation process model in Figure 8.2 (p. 134). However, Pugh (1993) affirms the inevitability of change because organisations are organic in nature while Kast and Rosenzweig (1985) see these changes as originating from both internal and external environments. According to Lewin (1943, 1958), these changes unfreeze the steady state by changing the forces that maintain the steady state. The innovation process model represents this change as shocks/stimuli and shows how it disrupts the steady state having been challenged by such external and internal forces.

The steady state is the normal state of doing things, and in the context of the six responding firms, this perhaps means the position where there are no compressed time demands. This is a situation where pre-contract documentation is assumed to run in the normal way and with the normal pace allowed in the procurement guidelines. While Firm B, C, D, E and F, confirm client's demand for compressed timeline on most of their projects, Firm A confirms it on all their projects. This means that status quo or the normal way of doing things is never maintained on these projects. For instance, the following are samples of the disruptions of the normal steady state within the respondent firms:

> The pressure comes heavily on us to meet the finishing deadline.
>
> (Firm A)

> They will tell you that they want it like yesterday. If you are under such pressure to produce very neat documents, it takes your time and so on.
>
> (Firm B)

> If you've given your work and we decide on a schedule, even if it is tight, we try and match it using different methodologies or processes in trying to satisfy you because we believe in client satisfaction.
>
> (Firm C)

> These clients take forever to raise the money. They don't rush the banks by telling the banks that they must approve the loan application in 2 weeks. They send feasibility studies and the bankers take all the time. Once it now comes to the issue of design and execution, they want to recover the time they have wasted with the banks by rushing the consultants.
>
> (Firm D)

> Q: There are some projects that need to be delivered but the client is giving very unreasonable time maybe due to budget bottleneck. Have you had such experience?
> A: Yes, we have…. a lot of them.
>
> (Firm E)

> Yes, we have been under pressure to deliver pre-contract documentations under very short timelines. That is more like the usual. That is what is usually obtainable as far as this industry is concerned. We are constantly under pressure.
>
> (Firm F)

Therefore, the demand for compressed timelines in all the projects of the six respondents appear to agree with the conditions for shocks/stimuli as expressed in literature and on the model. Hence, in line with Lincoln and Guba (1985), the conditions of compressed time demand in each of the six respondent firms can be transferred to the conditions of shocks/stimuli of the model. *Transferability,* (Lincoln and Guba, 1985, Moriceau, 2010) as it relates to shocks/stimuli, appears to have been achieved.

10.3.2 Optional Trajectories

The offset caused by the shocks or stimulus creates a problem. Problems according to Ackoff (1981) have three characteristics. There must be alternative courses of action that could be taken on it; any of such action taken on the situation must have the potential of having serious consequences; and there must exist doubt on which alternative action to be taken. Van de Ven *et al.* (2005, p. ix) opine that during innovation, the manager "needs a *road map* that explains how and why the innovation journey unfolds and what path are likely to lead to success or failure" even though Bessant *et al.* (2005) affirm the absence of any guaranteed formula for success when considered alongside the postulations of Ackoff (1981) on problem identification. The innovation process model represents these options as A, B, C, D and E from point 2 to point 4 and 5 as shown on Figure 8.2 (p. 134).

The respondent firms agree that they use different options to address the problem caused by shocks/stimulus during the demand for compressed timelines at pre-contract documentation stage of procurement. The various options offered by the firms include the use of ICT facilities, segmented training on competencies, organisational restructuring for faster decision-making and the use of alumni spare capacity. The following are some of the instances where optional trajectories are expressed:

> In the firm, we thought that instead of wasting resources on everybody training on the same areas or specializations, we got people trained in different aspects of measurements.
>
> (Firm A)

> Apart from the fact that we have a QA/QC officer before any document goes out, a partner must check as a further layer of quality assurance and quality control.
>
> (Firm B)

> To be capable to roam these kinds of processes effectively, you need to put modern technology in place. The first of the technology is that you need to have IT infrastructure in your office. IT infrastructure in that you can work from many points or workstations.
>
> (Firm C)

> In our office here we use the approximate quantities estimate to prepare our budget and that will be because we have software, the QSCAD software, for our measurements. And then we use the MasterBill interlinked with the QSCAD to prepare our bills of quantities.
>
> (Firm D)

> We finally agreed to change the procurement strategy completely away from what was known. The worst enemy of project delivery and administration when it comes to implementation is officialdom and bottlenecks.
>
> (Firm E)

> Our software, QSCAD, will take it. Once it is drawn with dimensions, we can calibrate it and we can get basic quantities. Though we use the NRM1 now so, we follow the system to get the first estimate. From this stage we move to preparing the bills of quantities itself.
>
> (Firm F)

This is synonymous with literature and the optional trajectories portion of the model, which argue that various options are offered through brainstorming for further consideration. However, while the model shows that the optimum option is selected like in a zero-sum game or a mutually exclusive scenario, empirical data from the six respondent firms differ by showing that the various options are not mutually exclusive but complementary. This brings Emily Durkheim's theory of *integration in differentiated social systems* (Durkheim, 1893; Turner, 1981) to focus. Although not articulated in the literature review, this theory is now brought to focus from the desire to seek the theoretical lens through which to view the position taken by the respondents. The justification for this emergent and reflection approach is found in the methodology of *experiential learning model* (Kolb, 1984) and *reflection of the practitioner researcher* (Mann, 2011) (see Figures 7.5 and 7.6 on pp. 116-117). Both models show how the reflective practitioner continues to oscillate between the two realms of professional practice and academic practice in an iterative manner in order to find meaning to the actions of practitioners or more appropriately to make *explicit,* the *tacit* knowledge of practice through reinforcement with theories. This could also be seen as a fundamental difference between the research process of academic research and practice-based research.

So, Emily Durkheim's theory of *integration in differentiated social systems* posits that while high competition for scarce resources propagates social differentiation within a social space, social solidarity through culture regulates social differentiation and brings about social integration. A confirmation of this theory was provided by the six respondent firms in the empirical studies through the complementarity of optional trajectories rather than mutual exclusiveness. As the competition for ideas (resources) brings about divergent views, the culture of teamwork therefore provides the integration of divergent ideas through complementarity. Consequently, the initial model would require some modifications to show the complementarity of optional trajectories for it to fulfil the *transferability* conditions amongst the six respondent firms (Lincoln and Guba, 1985; Moriceau, 2010). This is achieved by linking point 4 to point 5 on options A, B, D and E. This is also in line with the research design outlined in Figure 6.3 (p. 92) on modification of model. The final modified model of innovation process is illustrated in Figure 10.2.

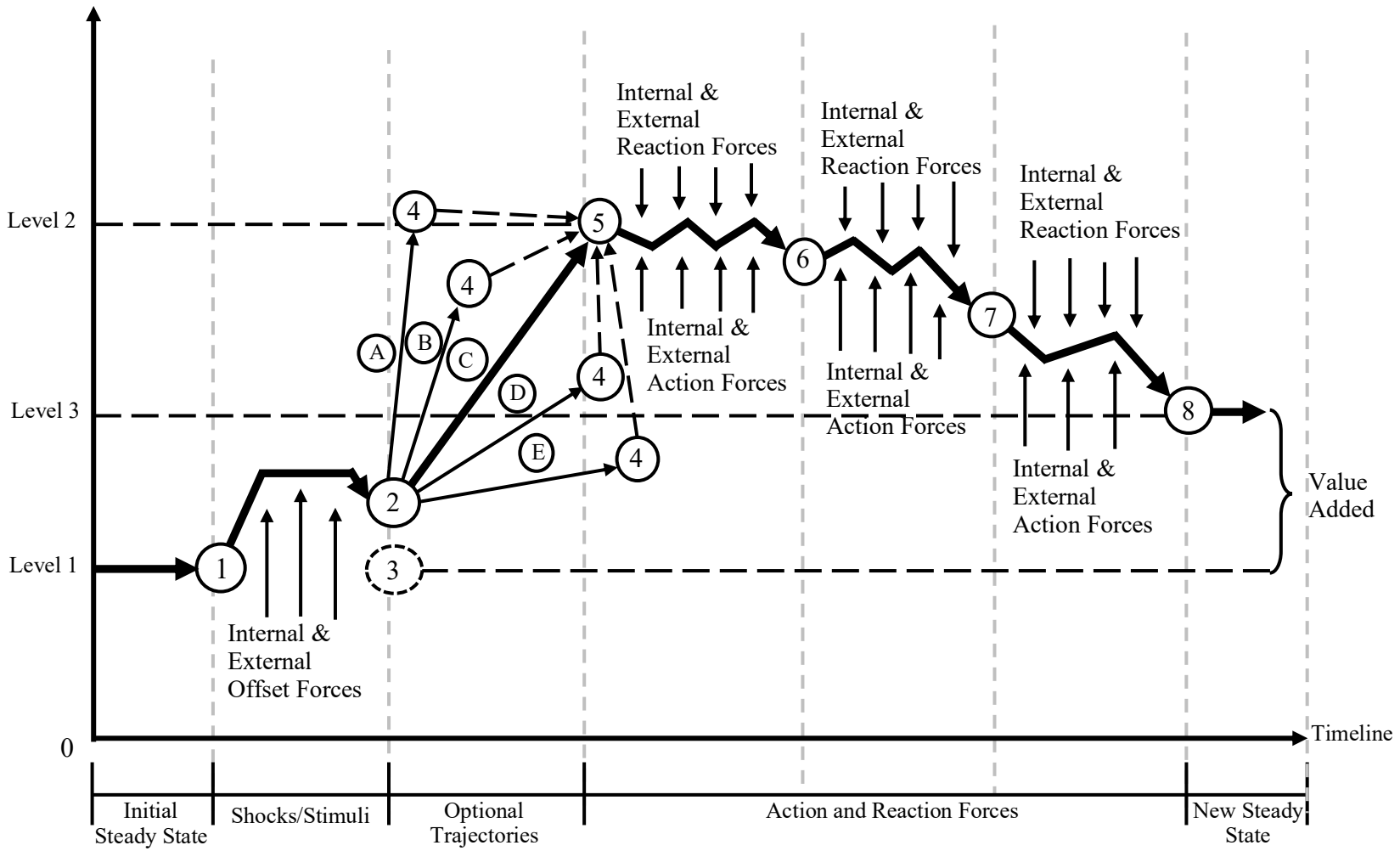
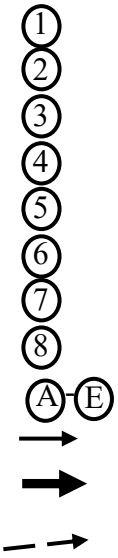


Figure 10.2: Final Model of Innovation Process in QS Firms [After Lewin (1943, 1958); Slaughter (1998); Bessant *et al*. (2005); Van de Ven *et al*. (2008); Barrett *et al*. (2008); Ackoff (1981); Turner (1981)

Key to Figure 10.2**:**



Point at where the steady state is disrupted by shocks or stimulus
Generation of many new divergent ideas through brainstorming
Breakaway point of initial steady state
Terminal point for unsuccessful divergent ideas
Untested new idea ready for assessment and implementation
Intermittent balance of the effects of action and reaction forces
Intermittent balance of the effects of action and reaction forces
Commencement of the new steady state
New divergent ideas generated through brainstorming
Action/Reaction Forces
Innovation Trajectory
Optional Trajectory

10.3.3 Action and Reaction Forces

Lewin (1943, 1958) deal extensively with the field theory and force field analysis. Lewin contends that there are forces that maintain every situation or position in an organisation and that the need to change such situation will require changing those forces that keep it in place. These sets of opposing forces are the external and internal action and reaction forces, which are clearly represented in the innovation process model. The forces work against each other under fluid participation of organisational personnel, technical challenges and advantages and, finance controller/top management actions. While the driving forces are the forces of change trying to move the organisation to a new state, the restraining forces are the forces that resist the change and seek to maintain the status quo. Empirical data from the six respondent firms confirm the presence of these opposing forces that occur during innovation. The respective firm demonstrates instances of driving forces and restraining forces during innovation as follows:

> In the digital age, I don't think you can work efficiently or effectively without imbibing the use of the current technology. We have been into using current technology in production of documentation for a very long time.
>
> (Driving force) (Firm A)

A key barrier to new ideas in any firm is when people are not giving themselves to learning. When you think that the level of knowledge you have is adequate for what you are doing and you do not want to improve yourself. That could stagnate an individual from developing.

(Restraining force) (Firm A)

The management matters because they are the driving force of the organisation. Every innovation needs the support of the management.

(Driving force) (Firm B)

There is the issue of size. I think the current practices in Nigeria little realise the limitation of size. While we would be involved in huge infrastructure, the current sizes we have are unlikely to be able to cope. … I think that if we remain in this stage, like a practice of 2 or 3 people, and then we have huge projects; it will be quite a challenge for quantity surveying firms.

(Restraining force) (Firm B)

Apart from them being creative, we have a department that is charged with reviewing some suggestions or ideas put forward as to what we need to do, which strategy to adopt and what would be the impacts, what is the deviation from the status quo, how do we explain or promote this outside.

(Driving force) (Firm C)

Our consultants also constrain themselves to stay thinking locally rather than thinking globally.

(Restraining force) (Firm C)

The external environment is the driving force because you cannot operate in isolation of the external environment. For example, I mentioned the issue of QSCAD and MasterBill software. We couldn't have generated that internally.

(Driving force) (Firm D)

One of the big barriers is finance, which is the cost of buying the product. This is a fact and it is a very strong issue.

(Restraining force) (Firm D)

The whole system is about the fact that nobody is above learning something new; not even the principals. It is also to encourage those below so that they consider what they do. They may not have to subordinate fully to whatever we feel or how we've been doing things before now. It is therefore to encourage them to find new ways of meeting the challenges

(Driving force) (Firm E)

> Most of us are intellectually and physically lazy. Many will want to just take a bill of quantities that was done years ago and just cancelling and amending it rather than doing a new bill outright. It still happens today even when we are gradually moving to a stage where doing a bill or not doing it is less important. Very few want to put in a thinking process.
>
> (Restraining force) (Firm E)

> We give the staff challenges. If you look at my office, we make sure that at least once in a year a younger person joins who has an open mind to quantity surveying. We actually don't want to pick somebody who has a rigid opinion so, we challenge them and we want them to challenge us.
>
> (Driving force) (Firm F)

> We tried to put that in it because we wanted the paperless system at work. But the downside of it is that even when we became paperless, we were working with people that still rely on paper.
>
> (Restraining force) (Firm F)

The six responding firms are therefore in agreement with literature and the model to the extent that the two opposing forces of action and reaction are always working to undermine each other. However, innovation happens when the action forces have a resultant advantage over the reaction forces. The conditions of driving and restraining forces in each of the six responding firms may be transferred to the conditions of action and reaction forces from the model. Hence *transferability,* (Lincoln and Guba, 1985; Moriceau, 2010) as it relates to the driving and restraining forces, appears to have been achieved.

10.3.4 Resultant Steady State

The resultant steady state is the *refreeze* segment of the 3-Step change model of Kurt Lewin. It shows the outcome of the innovation exercise and determines whether it was successful or not. For innovation to be successful it must have a value addition whether tangible or intangible. (Kimberly, 1981; Capaldo *et al.,* 1997; Barrett *et al.,* 2008). This is shown from point 8 upwards on the innovation process model as the new steady state on the X-axis on Figure 10.2 (p. 269). The value addition is represented by the difference between Level 3 and Level 1 on the Y-axis. Empirical data from the six respondent firms confirm the outcome of the innovation process as follows:

> We know that after all the investments in time and efforts, we can pick up some good rest afterwards. So, we are encouraged and motivated to put in as much time as we could to get it to a successful finish so that we can take a rest after it.
>
> (Firm A)

> I think we converted all our activities around the practice to ICT. We used to operate the basic Excel and Word thing but with the coming of the new software, which are sometimes very challenging, we are ICT compliant in the preparation of our scheduling, programming and specification.
>
> (Firm B)

> So, it is really a success and they are proud of it and we are also proud of it too that we participated and aided the success of the project.
>
> (Firm C)

> If we didn't show interest and commitment to QSCAD when we saw it, we won't have acquired the product some 15 years ago and that being the case we won't have been able to meet up with some high-profile projects that we handle now where there are time constraints. And having handled those projects within time constraints, it expanded our horizon in terms of meeting the needs of our customers.
>
> (Firm D)

> …with a manual that shows them how you can procure, how you must employ and what you must do. It was a big document and we are extremely proud of it. And for the 1st time ever, a programme of that magnitude was made in that incredible short time and it was applied and it was delivered successfully.
>
> (Firm E)

> But we've been able to overcome these pressures. Like I said earlier, we always deploy what we call our resources: technology, human resources as well as the experience of the firm.
>
> (Firm F)

The proposition of the innovation model is that the innovation process of every successful innovation should result into value addition. And where there is no value addition, it could be referred to as a mistake (Kimberly, 1981). The clear instances of successful outcome within the respondent firms show that there is value addition in the form of time saving, money saving, client satisfaction and the satisfaction of the respondent firms. The conditions of the innovation outcome in each of the six responding firms may therefore be transferred to the conditions of new steady state of the model as it relates to value addition. *Transferability,* (Lincoln and Guba, 1985, Moriceau, 2010) as it relates to innovation outcome, therefore appears to have been achieved.

10.3.5 Guidance Notes for QS Firms Using the Innovation Model

The following is a step-by-step guidance on the use of the innovation process model including what can be achieved and how it can be achieved by the model.

Step 1: Identification of Shock/Stimulus

The process of innovation starts with the presence and identification of a shock or stimulus in the firm which puts the organisation under pressure and tries to offset the existing process or status quo. The shock/stimulus causes friction that needs to be resolved. This could be an external pressure like client's request for compressed timeline or any other potent pressure that seems to demand performance on conditions that seem impossible. It could also come from internal sources like the dissatisfaction with the process of getting out deliverables in the firm which now seems outdated, slow and unproductive. It could equally be due to a combination of both external and internal sources like when a staff attends an external training on new methods and comes back into the firm to push for the implementation, in the firm, of what was learnt during the training. The QS firm must identify a friction at a time and complete the entire innovation process for that single friction. Every friction identified should follow a complete innovation process.

Step 2: Identification of Optional Trajectories.

This step is the brainstorming session where all optional trajectories are identified. This is an unrestricted process that is devoid of criticality and judgement. The QS firm needs to open up and let the ideas flow at this stage without restriction. This could be done in a staff meeting called for the purpose or as an item on the agenda of a management meeting. Without considering logic or similarities at this stage, the firm prepares a list of all suggested optional trajectories during the brainstorming session. As soon as the list is prepared, the meeting should be adjourned. If the brainstorming session is an item on the agenda of management meeting, discussions on the optional trajectories should end as soon as the list is compiled.

Step 3: Streamlining the Brainstorming List

After a couple of days or weeks, another meeting should be called to streamline the optional trajectories list. In this meeting, alliances are sought, differences are identified and relevance are considered. Some items are rejected as not relevant, some are combined as

expressing the same views while others may stand alone. A final optional trajectories list is now prepared for further action. Finally, after the consideration of the nature of the shock/stimulus, the key optional trajectory that will guide the direction of the process must be identified. This is the option that will have the most profound impact on the process.

Step 4: Effects of Driving and Restraining Forces.

The firm should prepare a two-column table listing all the driving (action) forces in one column and the restraining (reaction) forces in the other. Using a five-point system, the firm should apply appropriate weighting to each force. Depending on the impact of each force, weighting could be any number from 1 to 5 with 1 for minimum impact and 5 for maximum impact. While all driving forces are positive, all restraining forces are negative. Next is the adoption of the Force Field Analysis diagram, as shown in Figure 8.1 on page 131, to determine the resultant position of the trajectory. This is done at each point by summing up the weightings of driving forces on one hand and that of the restraining forces on the other hand to establish the net position of the resultant trajectory. The resultant could be positive, negative or unchanged. The trajectory is plotted accordingly until the driving and restraining forces are considered at all points. The final plot will determine the point of commencement of the new steady state and will indicate if the overall innovation process is positive or negative. If it is positive, it becomes a successful innovation but if it is negative, it becomes a mistake. Once the final outcome is successful, the firm can then implement the innovation by following the same process, but now in actual practice.

10.3.6 Conclusion

The discussions on the four major components of the innovation process model: shocks/stimuli on initial steady state, optional trajectories, action and reaction forces and, resultant steady state, were meant to validate the model using the empirical data from the six respondent firms. The discussions show that shocks/stimuli on the initial steady state happen in the six respondent firms in similar ways as proposed in the innovation process model. Hence *transferability,* as it relates to shocks/stimuli, appears to have been achieved. Although there is agreement between the responding firms and the model in that optional courses of action are provided for resolving shocks/stimuli, there is a marked difference in the way such options are acted upon. While the model argues for a mutually exclusive scenario, empirical data from the six respondent firms however provide scenarios where the options are different but complementary. Consequently, the initial model shown in

Figure 8.2 (p. 134) requires some modifications to show the complementarity of optional trajectories for it to fulfil the *transferability* conditions amongst the six respondent firms (Lincoln and Guba, 1985; Moriceau, 2010). This is incorporated in the final innovation process model, presented in Figure 10.2 (p. 269).

The driving and restraining forces in the six respondent firms include ICT deployment, top management support, paucity of funds and technical challenges. These are in agreement with the model's action and reaction forces hence *transferability,* as it relates to action and reaction forces on the model, appears to have been achieved by the driving and restraining forces of innovation in the six respondent firms. Finally, there are evidences of value addition at the end of the day in all the six respondent firms in the form of time savings, money savings, client satisfaction and the satisfaction of the respondent firms. These are also in agreement with the model's resultant steady state of value addition hence *transferability,* as it relates to resultant steady state, appears to have been achieved. The chapter concludes with step-by-step notes to guide firms in using the innovation process model.

CHAPTER ELEVEN

11.0 CONCLUSION AND RECOMMENDATIONS

11.1 Introduction

How this study has met the aim and objectives set out in Chapter 1 are presented in this final chapter. It therefore brings out the conclusions reached from the work. The structure of the chapter involves the presentation of the main findings of the research from literature and empirical study. This is followed with how each of the specific objectives set out has been addressed. Practice relevance of the research and its relevance to academe are then discussed. The chapter concludes with a discussion of the limitations of the study and the areas proposed for further research.

11.2 Main Findings

The key problem from practice, which was identified as the trigger for the study, is clients' pervasive demand for compressed timeline during pre-contract documentation in the construction industry in Nigeria. The research therefore sought to know how consultants, particularly quantity surveying firms, do respond to the demands. As *time* was a core issue at stake, major literature reviewed on *time* (Smith, 1969; Hedaa and Tonroos, 2001; Ramo, 2002; Chan, 2012; Boyd and Madzima, 2017) identified two types of times: *Chronos* and *Kairos*. While *Chronos* is autonomous, linear, quantitative, explicit and operates under conditions of certainty; *Kairos* on the other hand is heteronomous, expansive, qualitative, tacit and operates under conditions of uncertainty. In particular, literature (Hedaa and Tonroos, 2001; Ramo, 2002; Chan, 2012; Boyd and Madzima, 2017) agreed that construction procurements traditionally operate under *Chronos* and therefore lack capacities to accommodate contingencies such as unplanned demands for compressed timeline. Literature therefore concluded that the industry needs both *Chronos* and *Kairos* on construction procurements but in a negotiated *Chronos-Kairos* continuum that is highly skewed towards *Kairos*. Effectiveness (*Kairos*) is therefore more important than efficiency (*Chronos*). Using this yardstick therefore, general literature supports techniques of *innovation* and *building information modelling*, both having elements of *Chronos* and *Kairos*, as process improvement techniques that could assist in addressing the challenges of compressed time demands during the pre-contract documentation stage. However, as

there are little or no Nigerian-specific literature on *building information modelling* (Onungwa and Uduma-Olugu, 2017), literature further concluded that *innovation* technique presents the credible alternative to addressing the challenge of compressed time demands in Nigeria.

Innovation literature defined innovation as, "the effective generation and implementation of a new idea, which enhances overall organisational performance" (Sexton and Barrett, 2003b, p. 628). Although innovation literature is considered through two schools of thought: *market-based* and *resource-based* innovation (Leiringer, 2003), it is evident from the literature that innovative firms need to combine ideas from both schools of thought through the concept of *precipitating events* (Barrett *et al*., 2008) which seeks a delicate balance between the two schools of thought. Market-based innovation is innovation that is occasioned by the external forces to the firm whereas resource-based innovation is innovation that is occasioned by the internal forces within the firm. However, either classification is not absolute and does not operate like a silo. An initial consideration of key innovation models identifiable within the literature, identified that there was a gap in knowledge as there appeared to be no validated model to show how professional quantity surveying (QS) firms innovate in Nigeria particularly during the pre-contract period when there is usually ample pressure on the capacity and timeline for delivery of pre-contract documents. This gap in knowledge has now been filled with the development of the innovation process model.

Literature reviewed equally identified four key components of professional practice: the recognised body of knowledge, barrier to entry, mutual recognition and, meeting the needs of the society. Although professional practices are doing very well in the first three goals, literature concluded that there is a waning of trust in the ability of professions to meet societal needs (Hughes and Hughes, 2013). Client's needs, like the demand for compressed timelines during pre-contract documentation, are classified as part and parcel of societal needs which innovation literature has already concluded could be addressed through innovation strategies due to it being an unplanned contingency. However, there was a gap in knowledge on how professional service firms use innovation strategies to address clients' needs during the pre-contract documentation period. Literature classified Nigerian professional QS firms as generally small with low carrying capacity (Ogunsemi *et al.*, 2013) but there was no evidence that size of the firm affects its ability to innovate. Literature recognised the evidence that some Nigerian QS firms have embraced ICT but

concluded that there was no evidence that the embrace of ICT was linked to innovation. Through the empirical study however, it was concluded that Nigerian professional QS firms do innovate, particularly during the pre-contract documentation period, though the ability to innovate is constrained by finance. Hence, the empirical study is able to establish that size affects the ability of the Nigerian professional QS firms to innovate. The larger firms have more financial power and the ability to innovate particularly through the deployment of ICT. The empirical study therefore concluded that the acquisition of ICT infrastructure, mostly by the large firms, is an act of innovation particularly during the pre-contract documentation when firms are under extensive pressure for compressed timelines.

The most significant contribution of this study to knowledge is the development of an innovation process model, which shows the process of innovation development and outcome in professional QS firms. More importantly, the model can be used to analyse, interpret and understand qualitative data resulting from empirical studies on how innovation is carried out in professional service firms. This model differs from the existing models because none of the existing key models reviewed have the capacity to fully analyse, interpret and understand empirical data on how innovation is carried out in QS firms. For instance, generic innovation model (Barrett et al., 2008) is essentially for structuring discussions on innovation. Knowledge-based innovation model (Sexton and Lu, 2012) is for building knowledge capital from human capital, relationship capital and structural capital. Also, magnitude and linkage innovation model (Slaughter, 1998) is essentially a classification model of the five different types of innovation prevalent in the construction industry. They do not deal with process but magnitude of change and linkages to other components and systems. The process innovation model is divided into four major sections: shocks/stimuli, optional trajectories, action and reaction forces and, resultant steady state. From the initial shocks/stimuli, which affect the normal steady state, the model analyses the responses of various action and reaction forces impinging on the process of innovation until the resultant steady state is achieved. Using the model to analyse and interpret empirical data also makes it easy to understand which innovation process is successful and which one is a mistake, depending on the value addition/value destruction at the resultant steady state.

The next significant contribution of this research to knowledge is the development of a theoretical model for practice-based research. Literature concluded that there is a chasm between the views of academic research purists and practice-based researchers on the

status of practice-based research. While academe doubts the rigour and methodology of practice-based research, practice-based researchers argue that the gold standard of knowledge cannot continue to come only through the methodologies of the sciences as different approaches creates knowledge differently. For instance, Lennon and Whitford (1994, p. 2) opined that, "genuine knowledge does not reflect the subject who produced it", while Winter *et al.* (2000, p. 28) argued that, "a claim to practice-based knowledge is an obvious example of a claim to knowledge which is context-bound, and in which the subjectivity of the producer of the knowledge cannot be eliminated". For a proper disciplinary classification of built environment, literature concluded that the built environment is more of an interdisciplinary than a discipline.

The model therefore shows how the processes of DBEnv fulfil the four basic requirements of the Framework for Higher Education Qualifications at Level 8, the key prerequisites for any doctoral award in the UK. Finally, it showed how tacit knowledge is externalised through the combination of the concept of psychological contract (Kotter, 1973), expectancy theory (Vroom, 1964) and experiential learning model (Kolb, 1984; Nonaka and Takeuchi, 2005; Mann, 2011). Therefore, this model reconciles the basic opposing views of the academe and practice by demonstrating the rigour in practice-based research methodologies in the built environment and the validity of knowledge from practice through the use of eclectic mix of theories and concepts within the context of the professional doctorate in built environment (DBEnv). With the model, academic researchers are more likely to show greater understanding and consideration in objecting to the contextual subjectivity of practice-based research. The model therefore showed that the methodology of practice-based research might be different from that of academic research; it is no less rigorous and valid.

Another contribution of this research to knowledge is a methodological contribution. The research demonstrated how template analysis, a thematic method of data analysis, could be applied in built environment research. Template analysis is very flexible and can be used by most qualitative researchers for data analysis either through the development of *a priori* themes generated from literature or through the use *a posteriori* technique where themes are generated from the data without preconceptions. Hitherto however, template analysis had been very popular in healthcare and other social sciences but built environment. In the literature reviewed, there appears to be no evidence of the use of template analysis for data analysis in the built environment. However, having demonstrated how it could be used for

data analysis in the built environment research through the construction of appropriate templates presents an additional contribution to knowledge.

11.3 Review of the Objectives

The research aim is to investigate how QS practice firms innovate and how they respond, through innovation, to the pressures of compressed pre-contract timelines during pre-contract documentation in Nigeria. The research objectives as listed in Chapter 1 are:

1. To review existing literature on timing, process improvement and innovation as they relate to compressed time demands during pre-contract practice.
2. To situate this study within the framework of practice-led research in the built environment and propose a theoretical model for practice-based doctoral research.
3. To examine how QS firms innovate in practice and develop a model of innovation process in QS firms.
4. To explore how QS firms, through innovation, do effectively respond to the pressures of compressed pre-contract timelines during pre-contract documentation.
5. To propose recommendations for action for QS practitioners and policy-makers in Nigeria.

The following are demonstrations of how these specific objectives have been addressed in the study. The first research objective was addressed in Chapters one, two, three four and five while the second research objective was addressed in Chapters one and seven. Finally, the third, fourth, fifth and sixth research objectives spanned chapters eight, nine and ten.

11.3.1 Objective 1: Review of existing literature on timing, process improvement and innovation as they relate to compressed time demands during pre-contract practice

Literature, through the concepts of Chronos and Kairos, identified time as a critical element of the construction process. Time determines efficiency and affects the bottom line. Chronos, the linear and quantitative time, is mostly applied in the construction industry but is limited in benefits because of its inability to accommodate unforeseen changes. Construction projects do not run on straight lines as change orders, of different configurations and at different periods, are regular features of project delivery. Kairos, the qualitative time, is seldom used in the construction industry but has the ability and capacity to accommodate unforeseen changes. Literature concludes that there is need to achieve a

compromise between the Chronos and Kairos for construction projects because both would be needed to operate in complementary ways but with more inclination towards Kairos. The need for process improvement in construction delivery is to enable professional practice firms to be more efficient in the discharge of their responsibilities so as to accommodate inherent changes as they come. Literature identified the continual demand for compressed pre-contract timeline by employers as critical in the construction industry. Consultants are therefore struggling to meet these compressed time demands because timeframe is based on Chronos.

A review of the key process improvement methods in the industry indicate that many of the methods are Chronos-centric. Little wonder therefore that time becomes a serious issue on projects. *Total Quality Management* (TQM) is the principle of continuous improvement, which helps to eliminate wastes in the process. The nature of TQM uses a system approach to management and follows a sequential set of activities to achieve continuous improvement in very planned situations. It may however not be suitable where the problem in context is unplanned. Both the *Six Sigma* and *Toyota Kata* methodologies share the same characteristics of continuous improvement and highly planned activities, more or less, with TQM. Just like TQM also, both *Six Sigma* and *Toyota Kata* lack the capacity to cope with revolutionary changes and to deal with unforeseen and unplanned activities. The social complexity and randomness inherent in the problems of compressed timelines during the pre-contract documentation therefore makes the TQM, *Six Sigma* and *Toyota Kata* as inappropriate panacea.

Building Information modelling (BIM), as a process improvement method, provides the technological base for integrated project delivery and enables all parties on the project to be coordinated through a single repository where information and deliverables are made available in real-time for an efficient and effective project delivery. BIM also has the ability to accommodate unplanned changes within its framework due to the leverage provided by the awesome capability of its interoperability platform. *Innovation* is a new way of doing things, which brings added value and benefits to the process or product. Innovation is a new idea, sometimes revolutionary, which considers the nature of the problem, the strategies available and the appropriate timing (*Kairos*) before proffering a solution. Because of the ability of BIM and Innovation to accommodate unplanned changes within their frameworks, they have the capacity to deal with compressed timelines during pre-contract documentation of the design and construction process. However, BIM

adoption in Nigeria is in small pockets of uncoordinated attempts. In a scenario like this, the inherent benefits of BIM like real-time availability of information to all stakeholders, interoperability and integration, are lost. For this reason and in all options discussed in literature, Innovation appears to present the probable and reliable option for dealing with the problem of compressed timelines during pre-contract documentation in the Nigerian construction industry.

11.3.2 Objective 2: Situate the study within the framework of practice-led research in the built environment.

There appears to be a chasm between the views of academe and practitioners about knowledge generation in practice. These differences seem to border on the rigour of practice-based research and the closeness of the researcher to the research object. This has been stated over and over again in the different expressions from both sides of the divide. For instance, the academe insists that genuine knowledge should be independent of the subject that produced it so as to demonstrate distance (Lennon and Whitford, 1994) even when Bakan (1969) had opined that any gap between phenomenon and data, which requires interpretation, is susceptible to error. However, when knowledge is produced in context, practitioners equally insists that it can only be properly expressed through the contextual subjectivity of the producer (Winter *et al*., 2000). This is surmised by Mann (2014) in the expression, “the measure of the world and the position taken on it cannot be truer than the instrument”.

In addressing the above concerns, a theoretical model was developed to harmonise the divergent views and to show that practice-based research is not only rigorous but also valid. The model uses different guides, descriptors, concepts and models to demonstrate the rigour and validity of practice-based research. Consequently, the model shows how practice-based research at the doctoral level meets the four descriptors of the *Framework for Higher Education Qualifications*. These descriptors are: training in the systematic acquisition and understanding of existing knowledge within the built environment; attainment of a detailed understanding of the research methods and techniques in the built environment; conceptualisation, design and implementation of research for the generation of new knowledge and tailoring the research design to other situations in the built environment and; the creation of new knowledge or the advancement of existing knowledge to meet peer review standards in the built environment.

The model also demonstrates how through the *concept of psychological contract,* the deep-seated and unwritten but highly influential expectations are recognised sequel to being expressed. It equally shows the import of the *expectancy theory* as it supports the concept of psychological contract and how it becomes a major factor in determining outcomes because the behaviour of an individual is not based on clear objective reality but on the individual's perception of reality. Finally, the model uses *experiential learning model* to bring out the unwritten but highly influential expectations from the tacit form to the form of explicit recognition.

Situating this study within the framework of practice-based research is to demonstrate how this study meets the five different levels of the model as indicated on Figure 7.7 (p. 122). Level 1 of the model deals with expectations at the commencement of the research. This is synonymous with the *aim and objectives* of this study. This study has one aim and five objectives as listed in section 1.3 (p. 13). Level 2 of the model is about problem engagement and support system. There should be an acceptable method of engaging the problem. This study engages the problem through *case study interviews, personal observation and documentation*. Level 3 of the model deals with matching process where different expectations, ideas and data are matched and reconciled. This is correspondently demonstrated in this study through *data analysis*. Data were analysed using template analysis and NVivo 11 software. Level 4 of the model is the emergence of outcomes. This is demonstrated in the study through the collation of *results* and identification of *findings*. Level 5 is about meeting of expectations set out at level 1. This study deals with this through the *conclusion and recommendations* where an evaluation is made to see if the study meets the expectations set out in the aim and objectives of the study. This study therefore sits perfectly within the key structural components of the model at the five different levels as shown on Figure 7.7 (p. 122).

11.3.3 Objective 3: Examine how QS firms innovate in practice and develop a model of innovation process in QS firms.

Literature opines that professional service firms do innovate but could not ascertain how it is done. There is therefore a gap in knowledge on how innovation is carried out in professional service firms generally and, in particular, QS professional firms. It is necessary to model how innovation is carried out in professional QS firms as this could

provide a template for other firms. Literature alluded to the importance of models. For instance, models and frameworks are very important in executing any successful innovation strategy (Kanter, 1997). Models also provide the media for data analyses particularly for qualitative data and enable meaning to be derived from the data through structured templates. There are existing innovation models which deal with other areas of innovation but process. For instance, model for structuring innovation (Barrett et al., 2008), model for knowledge capital in innovation (Sexton and Lu, 2012) and models for magnitude and linkages of innovation (Slaughter, 1998). In the literature reviewed, there appears to be no indication of a model that deals with innovation process in professional service firms. Innovation process model is hereby developed using existing concepts and theories.

Literature (for example Maidique, 1980; Barrett *et al*., 2008; Van de Ven *et al*., 2008) provides the two schools of thought in innovation process: rational (linear) and behavioural (unpredictable), but argues for the harmonisation of the two schools so as to incorporate the key elements of both. This viewpoint was adopted in the development of this innovation model. The overall strategy was linear (moving from the initial steady state to a new steady state) however, it was allowed the behavioural characteristics at every point along the continuum. Bessant *et al.* (2005) refer to the concept of "relative stability" as depicting the initial steady state in an organisation before any change process commences. As innovation is about change, Kurt Lewin's 3-Step Model of change (*unfreeze*, *develop* and *refreeze*) (Lewin, 1943, 1958) was used to structure the innovation model.

In the final developed model, the steady state unfreezes through shocks or stimuli that offsets it. A typical example of shock, which runs through the whole gamut of the thesis, is compressed time demand at the pre-contract documentation stage. As the steady state is offset, it develops into optional trajectories where different options at solution are proposed. However, the resultant option which has the best "sustainable competitiveness" will define the path of the trajectory (Barrett *et al*., 2008, p. 14). This is the beginning of the *develop* stage of the Lewin's 3-Step model. However, the divergent options also bring Emily Durkheim's theory of *integration in differentiated social systems* (Turner, 1981) to focus. The theory professes that while high competition for scarce resources propagates social differentiation within a social space, social solidarity through culture regulates social differentiation and brings about social integration. This was confirmed by the six respondent firms in the empirical studies through the complementarity of optional

trajectories rather than mutual exclusiveness. As the competition for ideas (resources) brings about divergent views, the culture of teamwork provides the integration of divergent ideas through complementarity.

The concluding part of the *develop* stage of Lewin's 3-Step model is the action and reaction forces within the organisation. Lewin (1943, 1958) and Burnes and Cooke (2013) provide ideas from Force Field Theory about the two sets of forces (driving and restraining forces) which constitute the force field analysis that determines the position of the change initiative at any point in time. While the action forces are the forces driving for change, the reaction forces are restraining those action forces. This struggle continues until a resultant position is achieved to determine which set of forces had the upper hand. The resultant position is the *refreeze* segment of Lewin's 3-Step model of change. This final step may come up with added value if the innovation is successful. It may also come up with destroyed value if the innovation is unsuccessful. The final model is shown in Figure 10.2 (p. 269).

11.3.4 Objective 4: Explore how QS firms, through innovation, do effectively respond to the pressures of compressed pre-contract timelines during pre-contract documentation.

Literature has expressed the fact that compressed time demand during pre-contract documentation is endemic in the Nigerian construction industry even though it did not explain how QS firms respond to it effectively. However, the empirical study shows that innovation is central to the responses of QS firms to compressed time demands during pre-contract documentation. Firms adopt one innovative way or the other to respond effectively to compressed time demands. They are involved in the deployment of information and communication technology (ICT) to help in the quantification, collation, production and presentation of pre-contract documents. ICT, which involves the use of computer and sophisticated application software like MasterBill, CATO Pro, RIPAC, QSCAD and COSTX allow time to be collapsed while quality is at the same time enhanced.

In addition to ICT, firms also engage in one form of innovative organizational restructuring or the other. This may be the adoption of a flat organizational structure or the use of spare capacity of previous staff who have constituted themselves into alumni. Innovative organizational structure enhances devolution of power, faster decision making

and operational efficiency instead of the traditional hierarchical structure that fosters bureaucratic and centralised command and control system (Johnson and Scholes, 1999). Finally, firms also engage in innovative overlapping of project phases. For instance, overlapping the design and tendering phases whereby tendering could commence even though design is yet to be concluded. This is the use of fast-track management system even within the traditional procurement system.

11.3.5 Objective 5: Propose recommendations for action for QS practitioners and policy makers.

Recommendations for action in the industry bifurcates into two main streams: to QS firms and to the clients/employers. On each stream however, the study recommends what the industry should do. For instance, on the QS firms, they should embrace and significantly invest in ICT infrastructure particularly in the latest QS software. While some QS firms are yet to buy into the extensive use of ICT in Nigeria, many others are already enjoying the benefits which ICT brings to bear on the practice of quantity surveying particularly during compressed pre-contract period. The contribution of ICT, both hardware and software, to the ability of QS firms to respond to compressed pre-contract demand is significant.

QS firms should also embrace Building Information Modelling (BIM) as it provides the platform for future innovations in the industry. There are copious evidences of the deployment of BIM in developed economies which are highly probable of being replicated in project delivery in Nigeria in a matter of few years. QS firms should therefore get the necessary trainings in BIM as it may provide another significant factor in responding to compressed pre-contract time demands in the near future. QS firms should invest in the training of their staff and encourage them to attend relevant conferences, workshops and training seminars. This will present a highly conscious, competent and capable workforce ready to deal with issues of compressed time demands. QS firms should consider using fast-track procurement systems in project delivery as the traditional system is fraught with delays. Fast-track procurement systems would enable some phases of project delivery to run concurrently and consequently save time. For instance, design phase could run concurrently with tendering phase if a fast-track system is employed. At the end of the day, even with best of innovation, not every compressed pre-contract timeline is achievable. Hence, it would be appropriate for the QS firm to let the client know what is possible and what may not be possible, even as they strive to meet the demands of the clients.

On the other hand, clients/employers should strive to provide clear and understandable project briefs and on time. Clients should also plan appropriately and incorporate budgetary appropriation delays in their respective plans. The *fire brigade approach* to planning is inimical to project delivery and should be discouraged. It is also the responsibility of clients to ensure that available time for pre-contract documentation are allotted appropriately among the various consultants. Clients should therefore ensure that the architect and other designers do not appropriate the whole time available for the pre-contract documentation to themselves at the expense of the QS.

11.4 Relevance to Practice

This research developed two models: the theoretical model for practice-based research in the built environment and the innovation process model with each model having direct relevance to practice. Practice-based research model addresses the two critical concerns of the academy about practice-based research: rigour and distance. The theoretical model therefore has the potential of bridging the perception chasm between practice-based research and the purely academic research. The model may enable academic researchers to show more understanding and consideration to the contextual subjectivity of practice-based research having been convinced not only of the rigour and robustness of practice-based research but of the validity of knowledge generated from practice. Practitioners are therefore more likely to be encouraged to conduct more research at the workplace with its attendant potential of improving professional practices, industrial processes and industrial products. With this understanding, more research funding from the industry, directed to the critical areas of practice are more likely to be made available thereby expanding the research coast in industry and practice.

Also, through the innovation process model, this study has delineated the different steps and levels of innovation process in QS firms in a very simple and adaptable way. This model therefore becomes a guide to practice and it provides a template that can be used to gauge the performance of individual firms engaging in an innovation process right from the initial steady state through the disruptive stages and finally to the new steady state. It also provides a way to measure the value added or value destroyed in engaging in an innovation process. This study therefore provides the explicit answer to the question of whether and how QS firms do innovate.

11.5 Academic Relevance

With the development of the theoretical model for practice-based research in the built environment and the demonstration of its rigour and validity, more collaborative research could be engendered between the academe and practice thereby enabling both sides to jointly create new knowledge and jointly solve more practice-based problems. Such joint research engagement has the potentials of reconciling both methods of knowledge creation and perhaps work towards finding the golden thread that connects the essence of both research paradigms. There is always a dilemma in how to reconcile *practice* on the one hand with *enquiry* on the other hand (Archer, 1995). This builds on Mills's (1959) charge to researchers to use workplace practice experiences in their intellectual work by continually examining and interpreting such works through the eyes of research.

Over the years however, practice-based researchers have relied significantly on the methodology of the academy even though Nelson (2013), although speaking from the position of the arts, suggested that such methods are no more tenable in the present-day demand for practice as research. The built environment is therefore sandwiched between the two extremes of those that see practice in itself as research (like in the arts) and those that follow the scientific method exclusively (like in the academy). The built environment being an amalgam of the two divides and being an interdisciplinary (Jantsch, 1972; Chynoweth, 2009) therefore needs to find a compromise where its research can be comfortably carried out. This necessitates the development of the theoretical model.

The theoretical model differs from the previous models because while previous models try to associate exclusively with either of the paradigms, this theoretical model seeks to operate from the meeting points on both sides by creating knowledge from practice but externalise it through the structuring and explicit resources of the academy. The model therefore operates within a practice which is deeply rooted in active experimentation and concrete experience (tacit knowing) but benefits significantly from reflective observation and abstract conceptualisation (explicit externalisation). It is hoped that both sides of the divide would be comfortable using this model in researching practice-based problems.

The innovation process model shows how innovation is carried out in professional service firms particularly QS firms. Literature shows that there is always pressure on QS firms in

Nigeria to deliver pre-contract documentation within compressed timelines. However, there is a gap in knowledge on how this is done. This gap may be filled by this study which provides answers through empirical observations to demonstrate that not only do QS firms innovate, they use innovation to respond to the problems of compressed pre-contract time demands in the construction industry. Also, this study presents a model through which relevant qualitative data may be structured and analysed during empirical studies.

11.6 Limitations of the Study

1. There are six geopolitical zones in the country and it would have been ideal to select a firm from each geopolitical zone. However, due to insurgency, the study could only be conducted in three of the zones. It is unclear whether there may be outliers in the other three zones not sampled.
2. Time could not allow the conduct of a longitudinal action research which could have provided additional data from the firm of the researcher on specific details on the clientele which the respondents may be unwilling to offer.
3. Although the operations of the firms were observed during the interviews, the operations witnessed were a mixture of post-contract and pre-contract activities and not exclusively pre-contract duties.
4. Implicit personal biases, to a lesser extent, may have affected the interpretation of the data by the researcher since the researcher is also an owner of a QS firm.

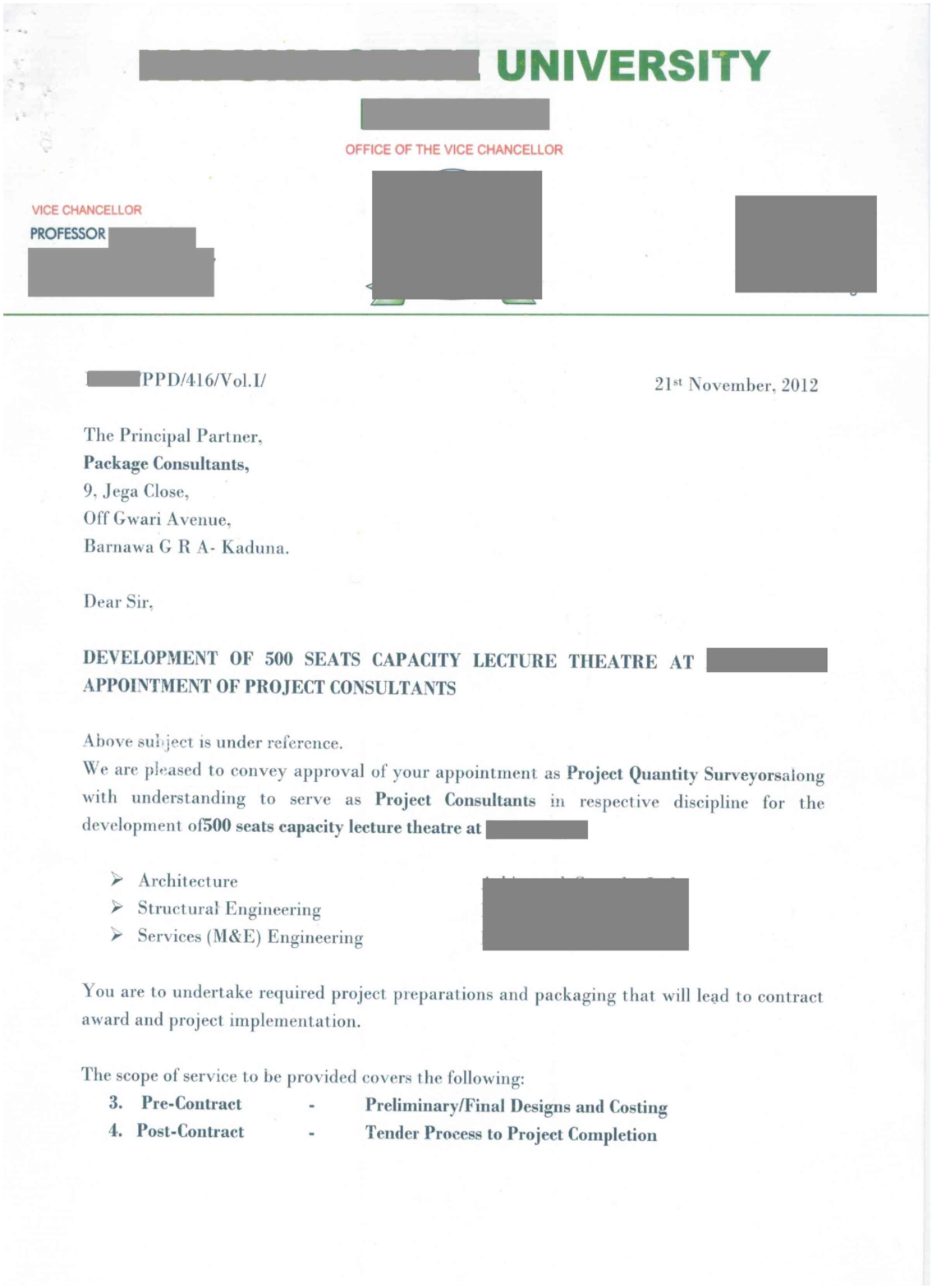
11.7 Further Research

1. It is recommended that future research could focus on an industry wide consideration to show how other consultants like the architects and engineers respond to compressed time demands in the construction industry.
2. Other research could be designed to test the innovation process model for other consultants like the architects and engineers.
3. Other studies could be designed to validate the theoretical model for practice-based research using auto-ethnography.
4. Further studies could also be designed to appraise clients' views on the effectiveness of the responses of QS firms to compressed time demands during pre-contract documentation.

5. Other research could be designed to determine the value added/value destroyed of any innovation initiative using the model provided in the innovation process in QS firms.
6. Finally, further studies could also evaluate the impacts of compressed pre-contract time demands on post-contract practice.

APPENDICES

Appendix A – Letter of Commission for Consultancy Service



[redacted] UNIVERSITY

[redacted]

OFFICE OF THE VICE CHANCELLOR

VICE CHANCELLOR

PROFESSOR [redacted]

[redacted]

[redacted]

[redacted]

[redacted]PPD/416/Vol.I/ 21st November, 2012

The Principal Partner,
Package Consultants,
9, Jega Close,
Off Gwari Avenue,
Barnawa G R A- Kaduna.

Dear Sir,

DEVELOPMENT OF 500 SEATS CAPACITY LECTURE THEATRE AT [redacted]
APPOINTMENT OF PROJECT CONSULTANTS

Above subject is under reference.
We are pleased to convey approval of your appointment as **Project Quantity Surveyors**along with understanding to serve as **Project Consultants** in respective discipline for the development of**500 seats capacity lecture theatre at** [redacted]

- Architecture
- Structural Engineering
- Services (M&E) Engineering

[redacted]

You are to undertake required project preparations and packaging that will lead to contract award and project implementation.

The scope of service to be provided covers the following:

3. **Pre-Contract** - **Preliminary/Final Designs and Costing**
4. **Post-Contract** - **Tender Process to Project Completion**

A **10%** charge of the project coast plus reimbursable expenses would be paid for the services to be applied in corresponding proportion to each Consultant in line with the Federal Government's approved Scale of Fees for consultancy services in the Construction Industry.

You are by this appointment required to submit complete set of contract documents for execution and award.

You may wish to contact the Director, Physical Planning and Development for further briefing.

We trust that you will exercise professional diligence and good judgment in the discharge of your assignment successfully.

Please accept my congratulations.

Yours faithfully,

[redacted]

Prof.
Vice Chancellor

Appendix B - Case Study Protocol for the Pilot/Exploratory Study

Title of Research Project:

Investigating the Innovation Response to Compressed Time Demands in Small QS firms in Nigeria

1.0 Introduction to Case Study and purpose

The aim of the study is to investigate the compressed time pressure that small QS (QS) firms in Nigeria face during the pre-contract documentation period and how they can effectively respond to those time demands within the context of technological innovation, for improved performance. The main objectives of the study are as follows:

1. To review the practice background and research context of technological innovation in pre-contract documentation in small QS firms.
2. To review existing literature on technological innovation in small firms.
3. To explore how small firms use technological innovation in responding to compressed time demands for pre-contract documentation in Nigeria.
4. To firm up the case study protocol in relation to the adequacy of the data collection tools in preparation for the doctoral research.
5. To propose recommendations for action by QS practitioners and policy-makers.

2.0 Data Collection Procedure

Site:

The site is the office of the unit of analysis in Kaduna, Nigeria.

Data Collection Plan:

Data will be collected using four multiple sources of evidence: documentation, archival records, interviews and direct observation. Data collection from documentation and archival records would depend on the documents that are made available by the firm while data from direct observation would depend on observations in the real-life context. Interviews would be conducted with three staff of the firm for the preliminary practice-based investigation. Interview protocol would be semi structured and each unit of data collection (interviewee/research participant) would be asked the same set of questions and in the same order.

3.0 Case Study Questions

Case Study Questions are as follows:

1) Describe the operations of the firm in detail.
    - When was the firm established?
    - What type of corporate and professional registration does the firm have?
    - What are the services that the firm provides?
    - What proportion of the firm's commission is from governments and the public sector?
    - What proportion of the firm's commissions is from the private sector?
    - What sectors are the firm's commissions from (e.g. building, highways and transportation, power plants, oil and gas, process, other infrastructure?
2) Describe the staffing of the firm briefly.
    - How many professional staff does the firm have?
    - How many directors?

- What are the attitudes of the staff to innovation initiatives?
- What are the attitudes of the directors to innovation initiatives?

3) How would you define innovation based on the culture of the firm?
4) What would the firm consider as the ideal time for pre-contract documentation for a QS firm?
    - For a project of less than N250m?
    - For a project of N250m to N1b?
    - For a project of over N1b?
5) What is the firm's actual general experience in practice of pre-contract documentation in relation to the availability of adequate time for the exercise?
    - For a project of less than N250m?
    - For a project of N250m to N1b?
    - For a project of over N1b?
6) What would the firm consider as the causes of the compressed time demands for pre-contract documentation?
7) How often does the firm get involved on projects with compressed time documentation?
8) Which particular unique case on which you had compressed time demand would you like to discuss in detail about?
9) In this particular case, what innovative method(s) did the firm use to respond to it?
10) Tell me about the outcome of the exercise?
    - How would you assess the firm's ability to deliver the documentation on time
    - On reflection, how would you consider the adequacy of your approach?
    - If you do the same thing again, how would you approach it?
11) What is the firm's experience in using bespoke/purpose-made application software for pre-contract documentation?
    - Which bespoke application software have you used?
    - What are the effects of the software on the firm's operation?
12) What were the challenges that the firm faced in using application software for pre-contract documentation?
    - How did the staff react to the software?
    - How did the partners react to the software
    - How did the client react to the deliverable of the software?
    - Assess the cost of the software vis-à-vis the value it delivered.
    - How difficult was it to learn the software?
    - Any other known challenge(s) posed by the use of the software?
13) How could these challenges be addressed?
    - What are the solutions that the firm used to surmount each challenge?
14) What advice would you give others?
    - To a QS firm on how to respond effectively to the challenges of compressed time demand for pre-contract documentation?
    - To a client who intends procuring a built asset?
    - To professional Institute on training needs for its members
    - To the lawmakers?
    - To Government and its agencies?
    - To private clients?
15) Any other comment?

Appendix C - Case Study Protocol for the Main Study

TITLE OF RESEARCH PROJECT

Innovation in QS Practice Firms: An Investigation of Innovation Response during Compressed Pre-contract Timelines in Nigeria.

INTRODUCTION TO CASE STUDY AND PURPOSE

The aim of the study is to investigate how QS firms innovate and how they respond, through innovation, to the pressures of compressed pre-contract timeline during the pre-contract documentation in Nigeria. The main objectives of the study are:

1. To propose a theoretical model for practice-based doctoral research and situate this study within the framework of practice-led research in the built environment.
2. To review existing literature and knowledge on innovation and pre-contract practice in QS firms.
3. To examine how QS firms innovate.
4. To identify the types of innovation within QS firms.
5. To explore how QS firms, through innovation, can effectively respond to the pressures of compressed pre-contract timelines during pre-contract documentation.
6. To develop a model of innovation process in QS firms.
7. To propose recommendations for action by QS practitioners and policy-makers in Nigeria.

Hence, the following research questions are consequently formulated:

1. What model can be used to investigate and understand practice-based phenomenon at the doctorate level?
2. Why do QS firms innovate?
3. How do QS firms innovate and what types of innovations do they engage in?
4. How can QS firms effectively respond, through innovation, to the pressures of compressed pre-contract timelines during pre-contract documentation?

DATA COLLECTION PROCEDURE AND QUESTIONS

Unit of Analysis

UNIT OF ANALYSIS: The unit of analysis is the respective QS firm.

Data Collection Plan

SITE: The site is the office of the respective unit of analysis

DATA COLLECTION PLAN: Data will be collected using four multiple sources of evidence: documentation, archival records, interviews and direct observation. Data collection from documentation and archival records would depend on the documents that are made available by the firm while data from direct observation will depend on observations in the real-life context. Interviews would be conducted with a minimum of two (2) staff of the firm for the practice-based investigation. Interview protocol would be semi structured and each unit of data collection (interviewee/research participant) would be asked the same set of questions and in the same order.

Overview of the firm

MAIN AIM: To establish a sufficient description of the firm and its operations.

QUESTIONS: Firm's establishment and registration with CAC and professional bodies; professional services offered by the firm; proportion of firm's operations offered to public/private sectors; proportion of commissions in the various construction categories (building, highway and transportation, oil and gas, power plants, other infrastructures); ownership structure, staffing level (professional/others)

SOURCES OF INFORMATION: Firm's documentation; Interviewees, Professional Bodies, Regulatory Bodies.

STRATEGIES: Obtain the organization structure of the firm and how they operate. Get the list of Clientele if possible.

Pre-contract practice and documentation

MAIN AIM: To establish the processes of pre-contract practice inherent in the firm for different categories of clientele and to establish the regularity of compressed timelines during the pre-contract documentation of projects and how it was addressed.

QUESTIONS: What procurement systems are used on projects and how often are they used; how are projects documented during pre-contract period; how important is the pre-contract documentation in terms of cost, quality and time, to the overall success of the project; what are the different documents required for a bidding exercise; are pre-contract documents ever produced under compressed timelines; give instances of how often; could you comment on what you think might be the reason why clients are eager to significantly shorten the pre-contract timelines; which particular project where you had compressed timelines would you wish to discuss in detail; which of these pre-contract documents are produced by the QS firm and which are produced by other consulting firms like Architects and Engineers; how are these documents produced during normal operations and during compressed timelines; what effects does the pre-contract documents of others consultants like Architects have on the ability of the QS firm to produce her own documents; how timely are the required pre-contract information provided by client and other consultants; on the project in context, are there letters of commission; can the contract documents be viewed?

SOURCES OF INFORMATION: Firm's documentation, Interviewees.

Innovation

MAIN AIM: To establish the firm's innovation process and the various innovations undertaken in the firm and the benefits (if any) of such innovations particularly during pre-contract practice.

QUESTIONS: What is the understanding of the firm about innovation; has the firm considered innovation in its operations; how are new ideas generated in the firm; do these new ideas come from inside the firm or do they come from outside sources; are there instances where the firm provided bespoke new ideas towards resolving a client's particular pre-contract documentation problem (examining the application of service management theory, Sundbo, 1997); what factors or conditions drive or encourage new ideas/innovation in the firm; what are the problems encountered in developing and realising these new ideas or innovation; what types of innovation or new ideas could be identified in the firm; which of the projects handled by the firm has identifiable innovation during compressed pre-contract documentation that could be discussed in details; what innovation did the firm employ on this project; what was the outcome; on reflection how would you assess the ability of the firm to deliver the documentation on time and at the right quality; how does compressed timeline affect the quality of the contract documents; discuss innovation in the firm generally; Discuss specific innovation on some projects under the technical, structural, goals and value, people or psychosocial, managerial and environmental subsystems.

SOURCES OF INFORMATION: Firm's documentation, Project information, Personal observation, Interviewees.

Appendix D - Case Study Interview Template for the Main Study

Introduction

This template, to be used for all interviews, provides the framework for obtaining most of the data for a doctoral thesis. The title of the research is "Innovation in QS Practice Firms: An Investigation of Innovation Response during Compressed Pre-Contract Timelines in Nigeria". This template is a breakdown of the previous case study protocol questions and is arranged in the way that the questions would be presented to research participants.

Overview of the firm

Good day and thank you for accepting to be interviewed on this research process in this firm.

Could you tell me about the origin and registration of the firm?
Probe: Ownership structure
What types of professional services does this firm offer?

Which ones are your main areas?
Probe: Proportion of commissions in the public versus private sectors
Probe: Proportion of building to civil engineering and other sectors.
Where are you based, I mean, your office(s)?

How many staff do you have?
Probe: Organogram
Probe: Managerial/Technical/Administrative
Probe: Professional/Others

Pre-Contract Practice and Documentation

What types of procurement systems are used on your projects?
Probe: Traditional/Design & Build/Management/Others like Direct Labour
Probe on frequency: How often are the respective procurement systems used?
What are the relevant documents for construction tendering process that are prepared during pre-contract timeline?
Probe: Building and Civil
Which of these documents are prepared by the QS and which are prepared by other consultants?
Probe: Architect and Engineers
How important is pre-contract documentation to the overall success of the project?
Probe: In terms of cost, quality and time
Run me through the process and comment on how difficult or easy it is to prepare each of these documents?
What do you think are the tools that a QS firm would require to prepare these documentations to meet the quality and timeframe required?
Probe: Availability of these tools in this particular firm.
What effects would the briefing process have on the preparation of contract documents generally and specifically?
Probe: Drawings, BoQs, Specifications, and Conditions of Contract.
In your experience, how realistic are the pre-contract timeframes given by different clients?
Probe: Public sector and private sector clients
Do you have any challenges in meeting these timeframes in your firm?

If yes, what are these challenges?

How have you been able to address these challenges in your firm?

Do you have any idea on why a client might ask that the contract documents be prepared within seemingly impossible short timeframes?

Do you have any experience in preparing contract documents within very short timeframes?
If yes, can we discuss a typical project on which this scenario played out?
Is there a letter of award that can be viewed on this typical project?
On this typical project, which documents were produced?
Probe: By QS, Architectural and Engineering firms.
Can the contract documents prepared for this typical project be viewed?
Was there any client brief for this typical project?
How timely did the client provide the brief?
What was the normal timeframe that would have been required by the consultants to produce these documents?
What timeframe was actually used to produce the documents?
Was there any difference in the normal and actual timeline and why?
What effects, if any, do the timely documentation from other consultants on this typical project have on the ability of the QS firm to produce its part of the documentation in time?
With hindsight, could you comment on your ability to meet the client requirements of compressed timeline on this typical project?
Probe: Quality wise and time wise
Are there any existing procurement guidelines in Nigeria on the timelines for producing contract documents generally for all projects and specifically in this typical project?

Please comment on the adequacy of the existing procurement guidelines in providing the framework for effectively responding to the challenge of compressed timelines?

Innovation in QS firm

What is the understanding of your firm of the term, "innovation"?
Should QS firms innovate?
How do they innovate?

What benefits do you think that QS firms that innovate stand to get?

Do you innovate in your firm?

Why?

Is there any process you go through to innovate in your firm?

If yes, could you share it?
Probe: Planned; Unplanned; Codified; Uncodified.
You stated that you used some methods/ways to address the compressed timelines during pre-contract documentation, what are these method(s)?

Would you consider any of these methods/ways as innovation?

Why?

Aside from innovation there is general improvement in methods and processes, which could also enhance effectiveness and efficiency. Do you engage in general improvement in your firm?

How do you differentiate the impacts of general improvement from that of innovation on your ability to meet the client's requirements for compressed pre-contract documentation time?

How are new ideas generated in your firm?

Do these new ideas come from within or outside the firm?

Could you recall any time that your firm provided a bespoke new idea towards resolving a client's particular pre-contract documentation problem?

Could you please discuss how the idea was conceived and implemented?

What factors or conditions drive or encourage new ideas/innovation in your firm?

What factors are the barriers to new ideas/innovation in your firm?

Which of the projects handled by your firm has identifiable innovation during compressed pre-contract documentation that could be discussed in details?

- What innovation did your firm employ on this project?
- What was the outcome?
- On reflection, how would you assess the ability of your firm to deliver the documentation?
- Probe: On time and to the required quality

Organisational theorists have described an organisation as a system made up of different sub-systems like: technical, structural, goals and values, people, managerial and environmental, do you agree with this viewpoint in the context of your firm?

If yes, what are the contributions of the different sub-systems in every innovation carried out in your firm?

- Probe: Technical, structural, goals and values, people, managerial, environmental sub-systems.

Do these sub-systems encourage, constrain, accept or reject innovation?

- Probe: Technical, structural, goals and values, people, managerial, environmental sub-systems.

Is there any idea you want to give to Nigerian QS firms on how to be innovative?

Appendix E - Sample Output from NVivo 11

Classification Assignments for Firms

	Location	Major clients	Size	Year Est.	Major Sector	Prof. Registration
Cases\\Firm E	"Southwest"	"Private sector"	"Medium"	"1990-2000"	"Building"	"NIQS and QSRBN"
Cases\\Firm C	"Northcentral"	"Public sector"	"Medium"	"1980-1990"	"Building"	"NIQS and QSRBN"
Cases\\Firm F	"Southwest"	"Private sector"	"Medium"	"1990-2000"	"Building"	"NIQS and QSRBN"
Cases\\Firm A	"Northwest"	"Public sector"	"Medium"	"1980-1990"	"Building"	"NIQS and QSRBN"
Cases\\Firm B	"Northwest"	"Public sector"	"Medium"	"1990-2000"	"Building"	"NIQS and QSRBN"
Cases\\Firm D	"Southwest"	"Private sector"	"Medium"	"1990-2000"	"Building"	"NIQS and QSRBN"

Nodes compared to Number of Coding References

Nodes	Number of coding ref.	Agg. number of coding ref.	Number of items coded	Agg. number of items coded
Nodes\\Types of Innovation\Resource push	21	21	8	8
Nodes\\Types of Innovation\Market pull	15	15	8	8
Nodes\\Types of Innovation	0	36	0	10
Nodes\\Responses to CT\Other methods	45	45	10	10
Nodes\\Responses to CT\Innovative methods	77	77	10	10
Nodes\\Responses to CT	0	122	0	10
Nodes\\Pre-cont. Docum.\Not so important	0	0	0	0
Nodes\\Pre-cont. Docum.\Highly important	38	38	10	10
Nodes\\Pre-contract Documentation	0	38	0	10
Nodes\\Innovation Outcome\Unsuccessful	2	2	1	1
Nodes\\Innovation Outcome\Successful	31	31	10	10
Nodes\\Innovation Outcome	0	33	0	10
Nodes\\Innovation Challenges\Reaction forces	20	20	8	8
Nodes\\Innovation Challenges\Action forces	62	62	10	10
Nodes\\Innovation Challenges	0	82	0	10
Nodes\\Information on CT\When is it exp.	5	5	5	5
Nodes\\Information on CT\Is it experienced	45	45	10	10
Nodes\\Information on CT	0	50	0	10
Nodes\\Causes of CT.\Internal factors	3	3	3	3
Nodes\\Causes of CT.\External factors	55	55	10	10
Nodes\\Causes of CT.	0	58	0	10
Nodes\\Advice to Industry\To practice	41	41	10	10
Nodes\\Advice to Industry\To clients	9	9	4	4
Nodes\\Advice to Industry	3	53	1	10

Appendix F – Ethical Approval Forms

Research, Innovation and Academic Engagement Ethical Approval Panel

Research Centres Support Team
G0.3 Joule House
University of Salford
M5 4WT

T +44(0)161 295 5278

www.salford.ac.uk/

6 January 2017

Femi Balogun

Dear Balogun,

RE: ETHICS APPLICATION ST16/17-31 – Innovation in Quantity Surveying Firms: An Investigation of Innovation Response during compressed Pre-Contract Timelines in Nigeria

Based on the information you provided, I am pleased to inform you that your application ST16/17-31 has been approved.

If there are any changes to the project and/ or its methodology, please inform the Panel as soon as possible by contacting S&T-ResearchEthics@salford.ac.uk

Yours sincerely,

Prof Mohammed Arif
Chair of the Science & Technology Research Ethics Panel
Professor of Sustainability and Process Management
School of Built Environment
University of Salford
Maxwell Building, The Crescent
Greater Manchester, UK M5 4WT
Phone: + 44 161 295 6829
Email: m.arif@salford.ac.uk
www.salford.ac.uk/ethics

School of the Built Environment
University of Salford
4th Floor, Maxwell Building
The Crescent, Salford, Greater Manchester
M5 4WT, UK

Date:

The Principal Partner
XXX
XX
X, Nigeria

Dear Sir

INVITATION AS A RESEARCH PARTICIPANT

I am a student on the Professional Doctorate programme (DBEnv) in the School of Built Environment of the University of Salford, Manchester, England. I am undertaking a research study titled, "**Innovation in Quantity Surveying Firms: An Investigation of Innovation Response during Compressed Pre-contract Timelines in Nigeria"**. The aim of the study is to investigate how quantity surveying firms innovate and how they respond, through innovation, to the pressures of compressed pre-contract timeline during pre-contract documentation in the Nigerian Construction Industry.

XXX is a firm that is well known to be at the forefront of a series of innovations in quantity surveying practice within Nigeria; not least the technological innovations that have boosted the firm's ability in meeting her client's needs effectively and efficiently. XXX has therefore been selected as one of the research participant firms for the conduct of the study.

I should be very grateful if you could accept to be a research participant for this study which, I believe, will be very beneficial to the theory and practice of the quantity surveying profession. The investigation, which takes the form of a case study, will require conducting interviews with about 2 of your staff with each interview lasting for about 1 hour 30 minutes. The interview could be conducted at any time convenient to the firm and the respective staff.

I can assure you that the study will not disrupt your working environment in any way and any data collected will remain confidential. I have already obtained an ethical approval for this study from the University.

The research, which was initially supervised, by Professor Peter Barrett is now being supervised by Dr Anthony Higham after the recent retirement of Professor Barrett from the University of Salford.

Yours sincerely

Femi Balogun
febalogun@yahoo.com or o.j.balogun1@edu.salford.ac.uk

School of the Built Environment
University of Salford
4th Floor, Maxwell Building
The Crescent, Salford, Greater Manchester
M5 4WT, UK

Date:

XXXX
XX, Nigeria

Dear Sir or Madam:

INVITATION AS A RESEARCH PARTICIPANT

I am a student on the Professional Doctorate programme (DBEnv) in the School of Built Environment of the University of Salford, Manchester, England. I am undertaking a research study titled, "**Innovation in Quantity Surveying Firms: An Investigation of Innovation Response during Compressed Pre-contract Timelines in Nigeria"**. The aim of the study is to investigate how quantity surveying firms innovate and how they respond, through innovation, to the pressures of compressed pre-contract timeline during pre-contract documentation in the Nigerian Construction Industry.

The nature of the research is a case study and an organisation, which you work for, has been selected as one of the cases to be studied as a unit of analysis. I would like to invite you as a research participant to partake in the interview section of the case study. The interview will run for either a session lasting for about one hour thirty minutes or two sessions with each session lasting for about one hour. The interview is planned to be tape-recorded.

I should be grateful if you could consent to being a participant in this research. To assist you in making your decision, I have attached herewith the following documents:

1. **Participant Information Sheet:** This provides further necessary details on the research and the research process.
2. **Research Participant Consent Form:** Which you should complete, sign and return to me.

I can assure you that the research will not disrupt your working environment in any way and any data collected will remain confidential. I have already obtained an ethical approval for this study from the University.

The research, which was initially supervised, by Professor Peter Barrett is now being supervised by Dr Anthony Higham after the recent retirement of Professor Barrett from the University of Salford.

Yours sincerely

Femi Balogun
febalogun@yahoo.com or o.j.balogun1@edu.salford.ac.uk

University of Salford MANCHESTER

PARTICIPANT INFORMATION SHEET

Study Title:
INNOVATION IN QUANTITY SURVEYING FIRMS: AN INVESTIGATION OF INNOVATION RESPONSE DURING COMPRESSED PRE-CONTRACT TIMELINES IN NIGERIA

Invitation Paragraph:
I would like to invite you to take part in a research study. Before you decide, you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Ask questions if anything you read is not clear or if you would like more information. Take time to decide whether or not to take part.

What is the purpose of the study?
The purpose of the study is to undertake a research in fulfilment of the award of the Doctoral degree in the School of the Built Environment at the University of Salford, UK.

Why have I been invited?
Your firm has been selected as one of the units of analysis for the study because your firm falls within the research's classification of quantity surveying firms with experience in innovation. Hence, I believe that experience like yours could help the research effort.

Do I have to take part?
I would like to state that taking part in the study is entirely voluntary. It is up to you to decide. I will describe the study and go through the information sheet, which I will give to you. I will then ask you to sign a consent form to show that you agreed to take part. You are free to withdraw at any time without giving a reason.

What will happen to me if I take part?
The research method is a case study using four instruments of data collection: semi-structured interview, documentation, archival records and direct observation. Data collection from documentation and archival records would depend on what document is made available to me by your firm. I should be grateful to look at any document that relates to innovation in in the processes of your firm. Every document or record would be treated with utmost confidentiality. Interviews would be conducted with about three staff of your firm including the principal. Interviews with you are designed to hold one occasion lasting for one hour and thirty minutes or on two occasions with each lasting for an average of one hour. Interviews will be tape-recorded to aid reliable transcription and a copy of the transcribed interview would be sent to you for confirmation before the information could be analysed. All information provided during the interview shall be treated with utmost confidentiality and no reference would be made to your identity or that of your firm in the analysis and report.

Expenses and payments?
Your participation in the study will not entitle you to receive any payments however, I am happy to settle any transport expense that you may incur in the course of this interview. I shall also settle the cost of photocopying any document that you may wish to provide.

What will I have to do?
I will expect you to attend the interview sessions on time and answer the questions to the best of your ability. The questions would be unstructured and will be tape-recorded. I would also appreciate any documentary evidences and archival records to buttress your responses.

What are the possible disadvantages and risks of taking part?
To the best of my ability, I am not aware of any disadvantage or risk to you in taking part in this study as a research participant.

What are the possible benefits of taking part?
I cannot promise that the study will help you but the information I get from the study will help to increase the understanding of innovation in small quantity surveying firms and how to effectively respond to it drivers and barriers. I also envisage that the result will inform policy decisions in practice and in government on issues relating to innovation in quantity surveying firms.

What if there is a problem?
If you have a concern about any aspect of this study, you should ask to speak with the researcher who will do his best to answer your questions on +234 8033411167. If you remain unhappy and wish to complain formally, you can do this through the University of Salford complaint procedure on: http://www.advice.salford.ac.uk/page/complaints

Will my taking part in the study be kept confidential?
All information, which is collected, about you during the course of the research will be kept strictly confidential, and any information about you which leaves your organisation will have your name and address removed so that you cannot be recognised.

What will happen if I don't carry on with the study?
If you withdraw from the study all the information and data collected from you, to date, will be destroyed and your name removed from all the study files

What will happen to the results of the research study?
The results of the research study will be published however; your name and address will not be identified in any report or publication.

Who is organising or sponsoring the research?
This research is sponsored by the researcher in fulfilment of the award of a Professional Doctorate in the Built Environment.

Further information and contact details:

Researcher's Details
Femi Balogun
XXXXXXX
XXXXXX
XXXXXX
Tel: XXXXXX
febalogun@yahoo.com or o.j.balogun1@edu.salford.ac.uk

University of Salford MANCHESTER

Title of Project:
INNOVATION IN QUANTITY SURVEYING FIRMS: AN INVESTIGATION OF INNOVATION RESPONSE DURING COMPRESSED PRE-CONTRACT TIMELINES IN NIGERIA

Name of Researcher: Olorunfemi Balogun

Name of Supervisor: Dr XXXXXXXXX

(Delete as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study and what my contribution will be.	**Yes**	**No**
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	**Yes**	**No**
➢ I agree to take part in the interview	**Yes**	**No** / **NA**
➢ I agree to the interview being tape recorded	**Yes**	**No** / **NA**
➢ I agree to digital images being taken during the research exercises	**Yes**	**No** / **NA**
➢ I understand that my participation is voluntary and that I can withdraw from the research at any time **without giving any reason**	**Yes**	**No**
➢ **I agree to take part in the above study**	**Yes**	**No**

Name of participant

Signature

Date

Name of researcher: Olorunfemi Balogun

Researcher's e-mail address: febalogun@yahoo.com or o.j.balogun1@edu.salford.ac.uk

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